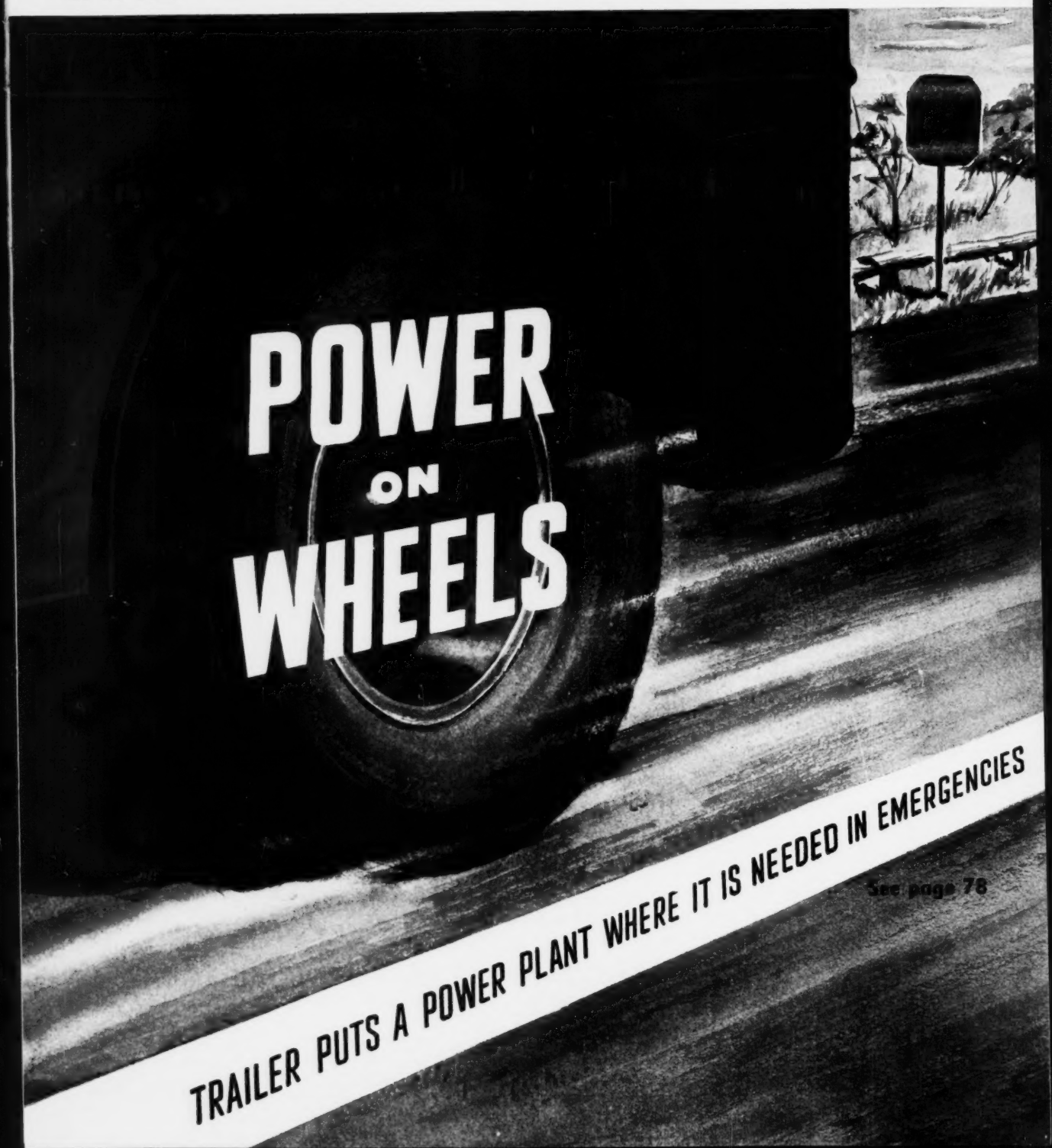
MARCH 9, 1953

Electrical World

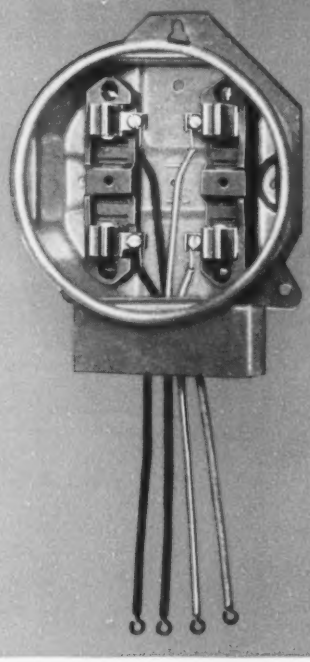
Price 35 Cents

A McGRAW-HILL PUBLICATION

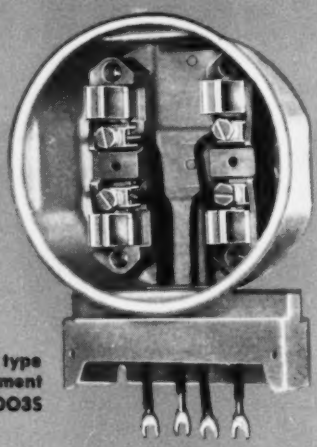


See page 78

HOW TO *SIMPLIFY* YOUR CHANGEOVER to SOCKET METERS



Indoor equipment
Cat. #SKOO1S



Raintight type
equipment
Cat. #SKOO3S

The MURRAY Combination Socket Meter Mounting and Adapter **is a packaged answer to changeover problems. Its one piece construction, rigidly joined in perfect alignment, reduces field assembly time—no fumbling with several parts, no cutting or forming of wires.**

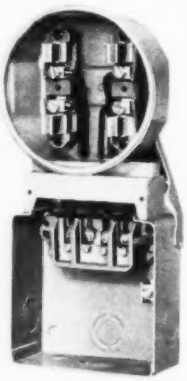
Bottom connected to back connected meters in a matter of MINUTES.

Changeovers are easy and inexpensive with the NEW Murray Socket Meter Adapter. To install—simply remove the bottom connected meter and mount the adapter into position. Adapter mounting holes exactly match those of the old meter. Then connect the wire leads and insert the back connected meter into the mounting.

SPECIAL FEATURES

- Adapter with formed wire leads to meet field conditions can be supplied on quantity orders. Fifth jaw can be readily installed for five terminal meters.
- Mounting ring has "breathers" to permit air circulation.
- Finished in durable, tough gray baked-on Melamine base paint. These Murray Socket Meter Adapters are backed by over half a century's service to the electrical industry.

For further information write Dept. EW, Murray Manufacturing Corporation, 1250 Atlantic Avenue, Brooklyn, N.Y.



SKOO3S installed on a typical Murray outdoor A Base Meter connection box (9600 type)

Murray®

MURRAY MANUFACTURING CORPORATION
1250 Atlantic Avenue, Brooklyn 16, New York

Service Entrance & Meter Equipment • Magnetic Hydraulic Circuit Breakers • Safety Switches (Types A, C & D) • Current Limiting Reactors • Crows'nest Aerial Ladders

Power

Electric power is so important today that if all sources of electricity were destroyed most of the population would die before the people could readjust themselves to the new living conditions. Even a one-day shutdown makes the people affected frantic. A two-day shutdown or longer drives the people to practically open rebellion. It matters not what the cause of the shutdown may be—storm, hurricane, sleet, ice, fire, or a plant breakdown—the customers want continuous service.

Usually electric service is disrupted not by trouble at the power plant but by trouble on the lines. Utilities are well aware of this and also of the latent public demand that these wire troubles be ended by putting them underground. Most companies now are taking intermediate steps such as using aerial cables, buried cables, or semi-underground. But few are making the public aware of the importance of these steps. There is some advice on this score in "Ready for the Next Storm?" on page 71.

Power on Wheels

The Navy during the war built several mobile power plants. These trains have been switched to a number of locations in the United States and Mexico where there were power shortages of long duration and 10,000 kw would be of great help.

Now for outages of shorter duration and especially for those caused by changing or moving conductors or line and substation equipment, Duke Power Co is using a 500-kw, trailer-mounted, generating station. For details see page 78.

Power on Keels

Korea is a long way from the United States, but these days it's important to many Americans. Never too rich in electric capacity, the country has suffered greatly as the result of the war. Contributing to the discomfort of the South Koreans and the UN forces is the fact that most power plants are in Red territory.

To solve the supply problem the Army has brought in three power barges. You'll find the details in the March 16 issue.

Electrical World

Published for 79 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

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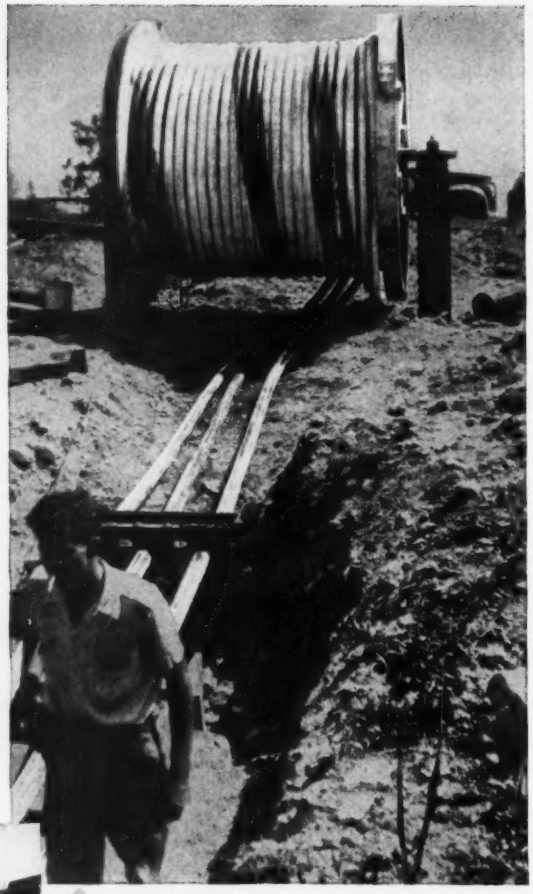
ingenious methods simplified laying of three Okonite submarine cables

Three 12,000-volt Okonite submarine cables, each 830 feet long were installed as outgoing power lines across the Colorado River for a new addition to the Municipal Power Plant of the City of Austin, Texas. Some of the details of this unusual installation are given below:



To simplify the laying, the three lengths of cable were paralleled on one steel reel 10 feet in diameter. Because of the shallow water and the great weight of the reel and cable (over 46,000 lbs.) the usual method of mounting the reel on a barge was impractical. Instead, the reel was cradled on a concrete foundation and the cables were passed through a feeder mechanism to provide proper spacing.

The three cables were attached to a special steel bridle weighing over 400 pounds, so they could be pulled at the same time. Two 50-gallon oil drums were used to float the bridle.

Oil drums spaced 10 feet apart were also used to float the cables. When the cables had been pulled across the river they were lowered into a trench dug by dragline five feet below the bed of the river. The submarine cables were then spliced to Okolite-Okoprene cables in manholes at each end of the submarine line run.

Tough and unusual cable installations have a way of turning out to be Okonite. We'd be glad to send you the full facts on *this* job—or to assist in helping you to solve a particular cable problem of your own. Just write The Okonite Company, Passaic, N. J.

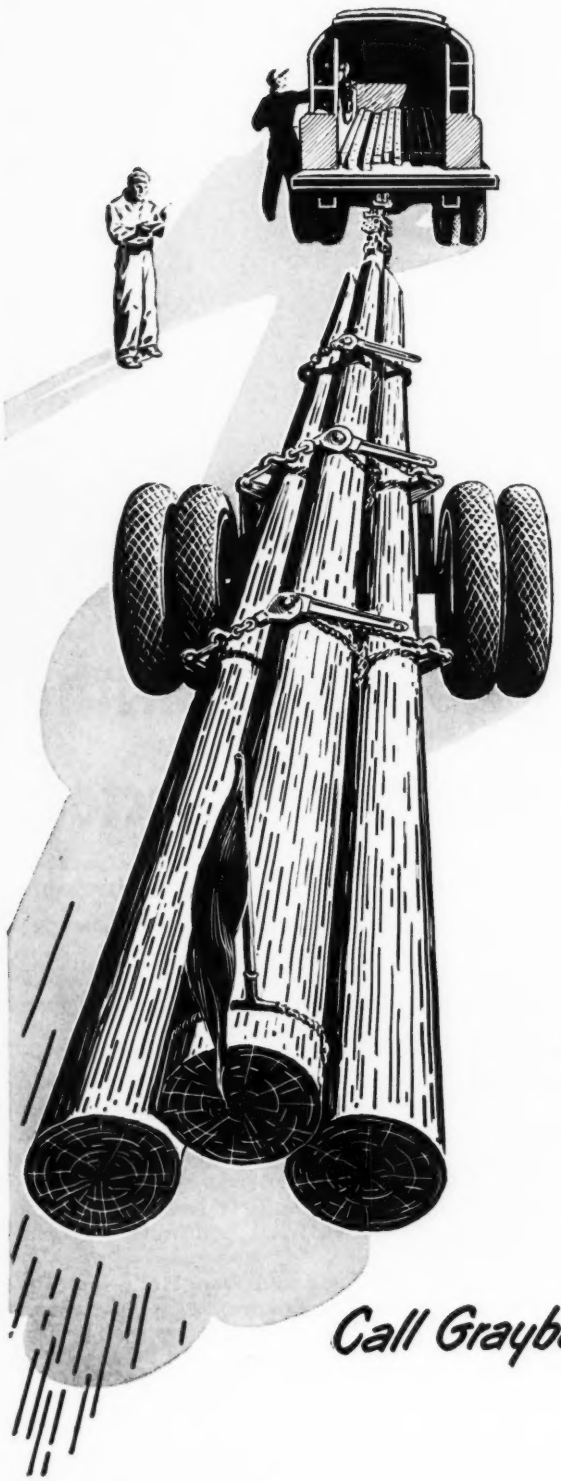
CONSULTING ENGINEERS: Burns & McDonnell Engineering Co., Kansas City, Missouri. ELECTRICAL CONTRACTOR: W. K. Jennings Electric Co., Austin, Texas. JOBBER: Priester Supply Co., Dallas, Texas.

OKONITE *insulated cables*

1486

POLES and CROSSARMS

– via GraybaR



There's a type of pole and crossarm for every power-line requirement. And an order placed with Graybar means that you can get the kind you need *when* and *where* you need it.

Because differing conditions influence local preferences, Graybar distributes *all* types of poles – full-length, pressure-treated Fir and Cedar... butt-treated Northern and Western Cedar. They're all carefully selected and processed to provide maximum strength and durability.

Graybar-distributed crossarms are seasoned under rigid methods – are strong, long-lasting and provide a wide margin of safety in the line.

For help in solving usual, and *unusual*, pole-line problems, call on Graybar Outside Construction Specialists – they're located in key areas throughout the nation. And for convenience, speed and direct action, route all your line material orders via Graybar. *Graybar Electric Co., Inc. Executive Offices: Graybar Building, 420 Lexington Avenue, New York 17, N. Y.*

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Call Graybar first for...

GraybaR *Everything Electrical*

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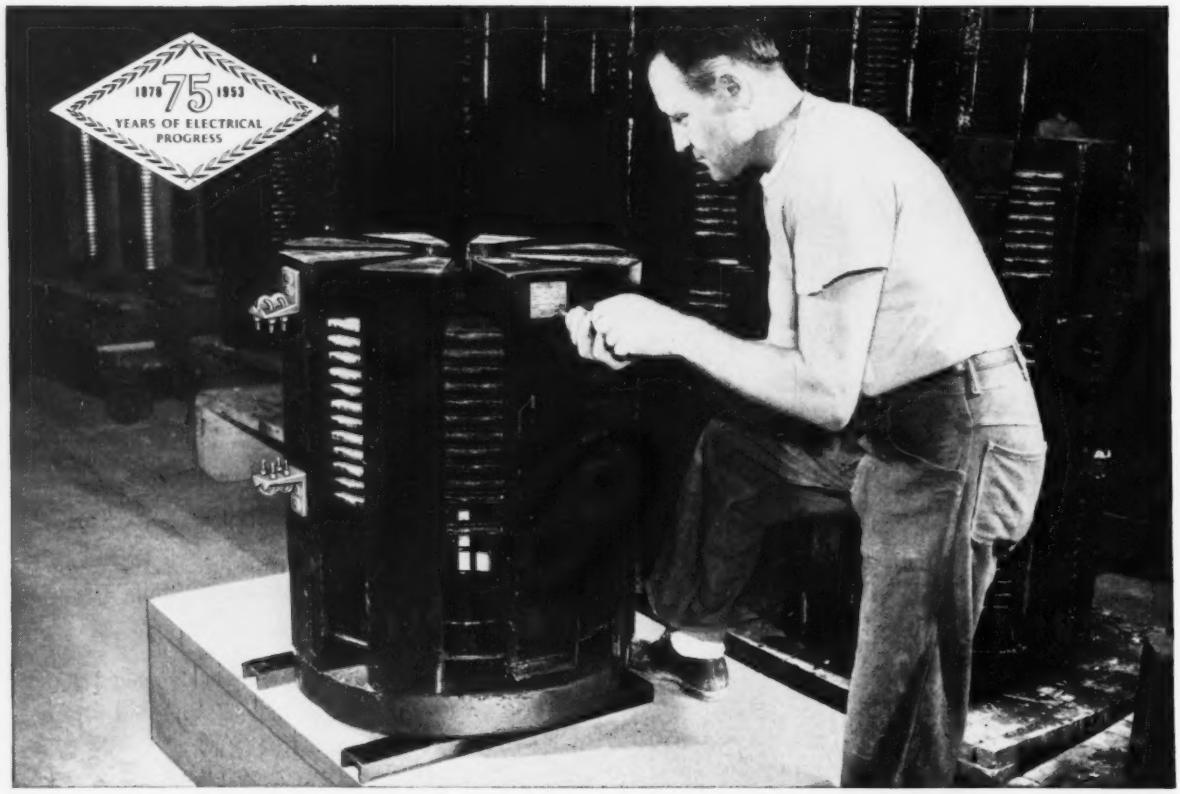

Reactor shipments in 20 weeks with G-E "Repetitive Manufacture" reactors

New cast-in-concrete designs meet ASA standards C-57.16 for current-limiting reactors and AIEE-32 standards for neutral grounding devices

By applying "repetitive manufacture" techniques to its cast-in-concrete current-limiting reactors, General Electric can meet your need for faster reactor shipments. You can order RM reactors for delivery in 20 weeks—25 weeks if you desire metal enclosures.

The new RM reactors offer the same "extra service" features that have made G-E reactors industry's favorites for more than 35 years—features that give them almost unlimited life and reduce maintenance practically to zero.

Non-aging glass insulation. G-E reactors utilize glass insulation with its ability to withstand extremely high temperatures . . . its resistance to moisture . . . and its high electrical strength.

Continually transposed conductors assure more uniform current distribution. They minimize losses . . . increase short-circuit strength . . . make possible a smaller, more compact reactor.

RM reactor designs can be obtained in the 3 to 10 per cent reactance range, for 60-cycle circuits in EEI-NEMA recommended voltages up to 14.4 kv. Single-phase designs for both indoor and outdoor service; three-phase designs for indoor service only.

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For detailed information on the new RM reactor designs, write Section 422-1, General Electric Company, Schenectady 5, New York.

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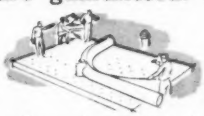
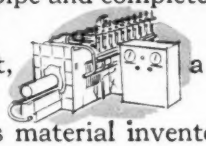
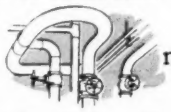
SHOP FABRICATION OF PIPING

because . . . both quality and economy are guaranteed. Piping is fabricated in Grinnell shops under ideal conditions,  with modern equipment, by personnel qualified in all classes of work. Price (determined in advance) includes competent engineering, scheduling and shop sketches, efficient material procurement. Grinnell supplies heat, light, power, water, compressed air, expendable tools and supplies. Grinnell shops have large storage areas for pipe and completed assemblies, expensive modern equipment,  a permanent staff of skilled workers. Grinnell finances material inventories and payrolls; carries insurance. The customer pays for no waste material or spoilage. Shop fabricated piping is rigidly inspected and tested to meet exacting requirements of customer's specifications and applicable codes. It is cleaned inside and outside and painted. Squared to standard dimensional tolerances, sub-assemblies are erected at the job site  more quickly and easily. It all adds up to this . . . shop fabrication by Grinnell guarantees quality and economy.

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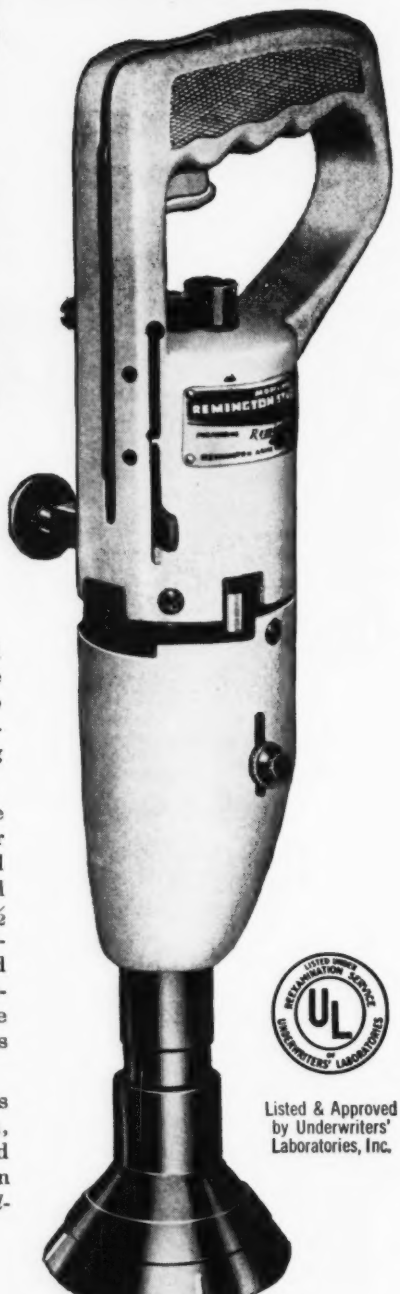
industrial supplies • Grinnell automatic sprinkler fire protection systems • Amco air conditioning systems

You can drive studs ARROW STRAIGHT into steel or concrete with

MODEL 450 REMINGTON STUD DRIVER

The widest power range of any powder-actuated tool!



The Model 450 Remington Stud Driver is the most efficient fastening method in use today. Its exclusive advantages are unequaled by any other powder-actuated tool.

You get consistently straight driving on every type of fastening job with the long heel cap on all Remington cartridges. It acts as a perfect gas seal and provides extra power. These colored heel caps clearly mark the six different 32-caliber power loads that are available. You can select the *right* cartridge for each job quickly and easily.

The Remington Stud Driver needs no separate parts for power control or loading—nothing to lose or break. Just a twist of the wrist opens the Model 450. Insert stud and power cartridge as a unit . . . close and you're ready. Triple safe, this superior tool has a separate lever that must be depressed and *held* with one hand before and during squeezing of the trigger with the other hand. Two *additional* devices prevent operation except in proper fastening position.

Completely self-powered, the Model 450 sets up to 5 studs per minute in fastening steel or wood structural pieces to concrete or steel surfaces. Its light weight—only 5½ pounds—makes it ideal for use overhead or in confined spaces. To speed operation further, an exclusive ejector snaps the fired case out of the tool instantly—no fumbling, no tools needed.

Test-proved to be the world's finest and speediest fastening system, the Model 450 Remington Stud Driver is made by Remington Arms Company, Inc., *America's oldest sporting arms manufacturer.*

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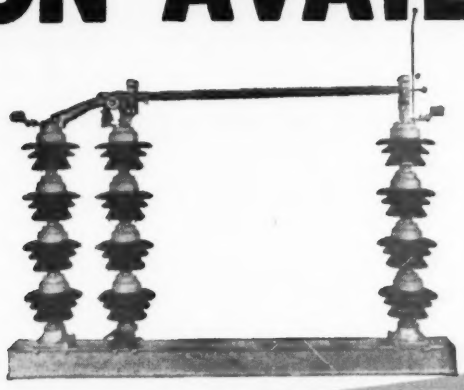
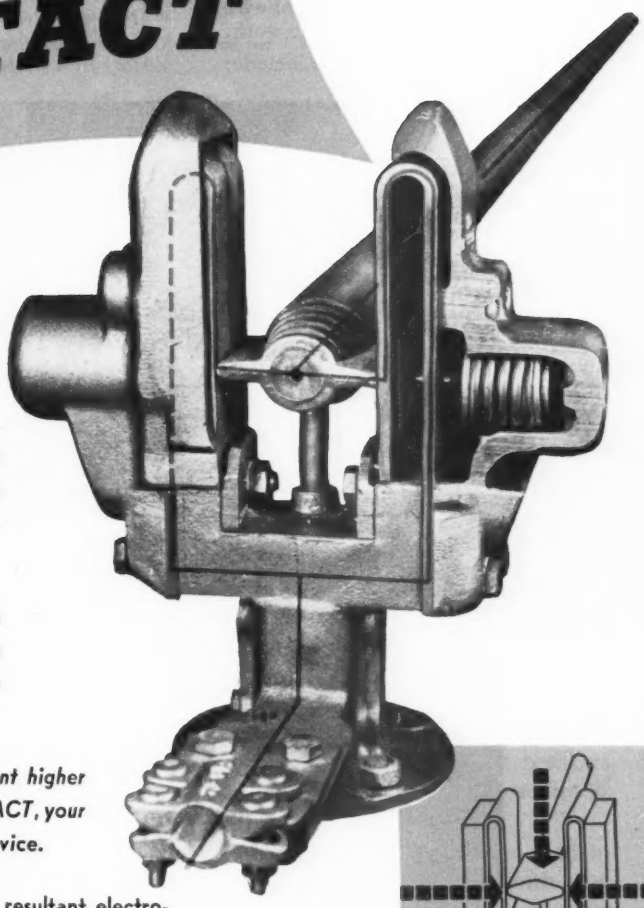


AMPLITACT

TRADE MARK

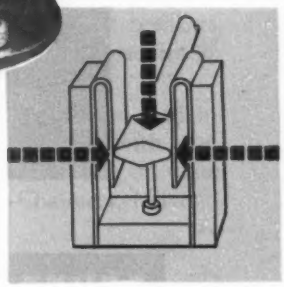


The AMPLITACT, Southern States' revolutionary contact, will soon be available in the Type WAG air break switch.

Employing the magnetic fields surrounding current carrying members to effect higher contact pressure, the AMPLITACT responds to any increase in current flow with a proportional increase in contact pressure.

Incorporation of the AMPLITACT in the Type WAG assures even more dependable operation from a switch long recognized as a leader in the field.

Increased system capacities with resultant higher short circuit currents demand the AMPLITACT, your best safeguard to assure uninterrupted service.



The AMPLITACT design principle is such that resultant electromagnetic forces induced by current flowing through the contacts . . .

1. Greatly increase contact pressure.
2. Force the blade firmly in the engaged position.

Southern States
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Equipment Corp.
GEORGIA

Variac® MOTOR SPEED CONTROLS for PRECISION Machine Work

Three models of the Variac Speed Control provide continuous speed-adjustment of

1/15 to 3/4 hp d-c motors operating from a-c lines.

Superior operating characteristics ideally adapt these instruments for control of exacting mechanical operations, such as precision grinding, drilling, toroidial wire winding, and critical lathe work.

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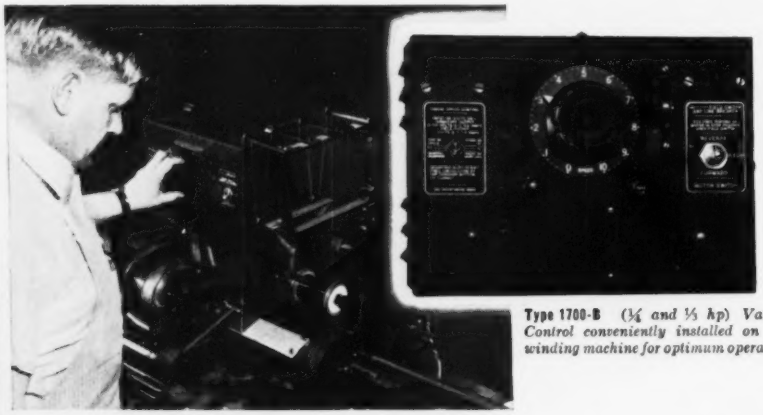
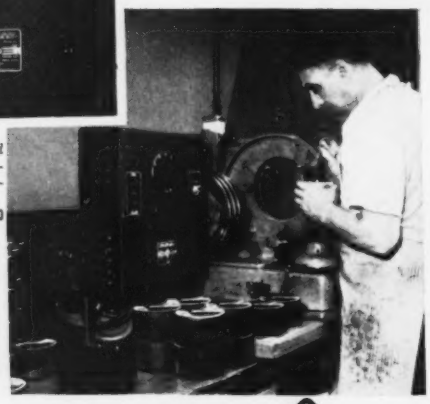
- ★ *Simple installation — complete control box can be mounted right at machine — no remote control cabling or auxiliaries needed*
- ★ *Over-all regulation is 1.5 to 2 times that obtained from operation directly from d-c power lines*



Type 1700-B *(¼ and ½ hp) Variac Motor Speed Control conveniently installed on a resistance-card winding machine for optimum operation.* **Price $160**

Type 1702-A *(¼ and ¾ hp) facilitates high-speed winding on toroidial coil winder.* **Price $230**



Type 1701-A *(1/15 hp and less) controls high-speed drill presses at speeds up to 20,000 rpm, for increased production.* **Price $75**

GENERAL RADIO® Company

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Operator combines advantages of Pneumatic and Hydraulic Operation, *sets new standards in reliability*

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- Operating characteristics unaffected by temperature change.
- Manual pump will provide power for breaker maintenance operation at full speed or at completely controlled speed. Complete installation and test can be made without control power.
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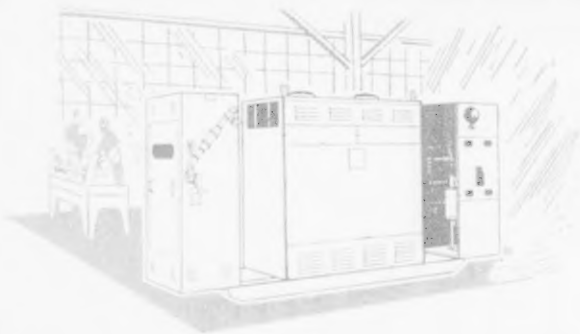

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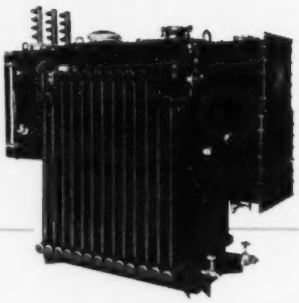
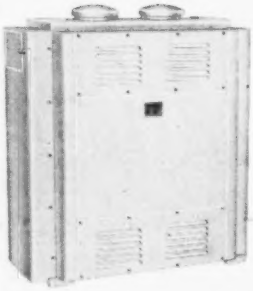
See and read about actual transformer installation on the job around the world . . . evidence that your confidence in STANDARD is well placed.

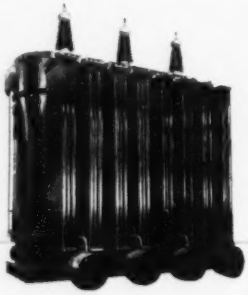
Askarel filled subway type network transformer, 500 KVA, 12480 to 216Y/125 volts, 3-phase, 60-cycle, complete with high voltage disconnect and grounding switch, low voltage network protector, and electrical interlocks.





Dry type air-cooled, load center transformer, 225 KVA, 3-phase, 60-cycle, 2400 to 120/208Y volts. Gang operated oil-fused cutouts are included with operating handle which is accessible through door in end of cabinet.

Power transformer, 10,000/12,500 KVA, 3-phase, 50-cycle, voltage 69,000Y to 13,200Y, with tertiary winding of 3500 KVA, air blast equipment for supplemental rating, low voltage terminal chamber and wheels.



Everything points to . .

Standard

THE STANDARD TRANSFORMER COMPANY

Trade Mark ®

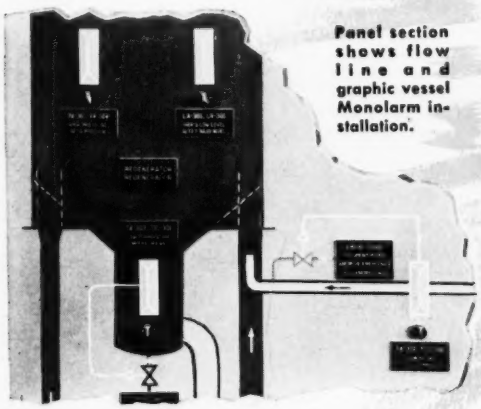
WARREN, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

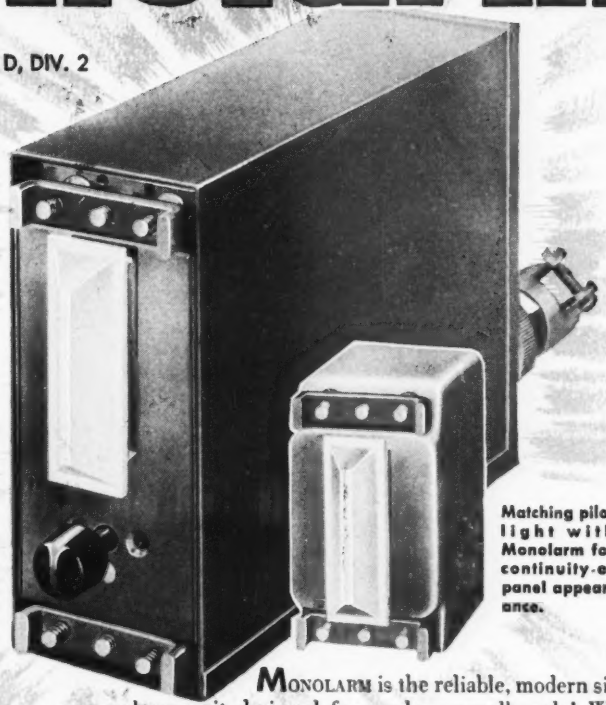
Announcing . . . **R&S Monolarm®**

CLASS I, GROUPS C & D, DIV. 2

. . . the *Compact* signal alarm unit ideal for flow line and graphic panels



Panel section shows flow line and graphic vessel Monolarm installation.



Matching pilot light with Monolarm for continuity of panel appearance.

MONOLARM is the reliable, modern signal alarm unit designed for modern panelboards! Wherever instrumentation space is at a premium—wherever flow lines and graphic vessels must tell their visual processing story without interference from bulky signal alarms—this exclusive R & S development takes over with minimum space on front and back of panels.

Monolarm offers instant warning against any abnormality occurring in a processing operation at any time—and safeguards against expensive losses of production and materials. Should any abnormality occur, the normal light ceases to shine . . . the alarm light flashes rapidly on and off . . . also an external howler, if used, is sounded. Acknowledgment by the operator must be made by turning the re-set switch . . . the alarm light then assumes a steady state until the condition is remedied . . . then Monolarm automatically resumes its normal indication.

Several hundred highly successful installations are already completed. Monolarm is now available on your order.

Advantages of R&S MONOLARM

1. A single narrow bezel and button fits into a flow or graphic line diagram without interrupting the continuity of the design story.
2. Occupies minimum back-of-panel mounting space.
3. Lighting indications in two or three colors on *one* bezel.
4. Relamping is quick and easy from the front of the panel.
5. Instantaneous connect and disconnect of the power supply cable to Monolarm is provided by an interlocking switch receptacle and plug.
6. Maximum safety is afforded by interlocking the plug with the hermetically sealed switch, making it impossible to insert or withdraw plug under load. When the polarized plug is inserted into the receptacle and the plug shell is turned clockwise, it turns the switch to the "On" position and vice-versa.
7. Hermetically sealed plug-relays instantly removable if replacement is necessary.
8. Time delay circuit available to counteract turbulence and vibration when abnormal condition is reached.

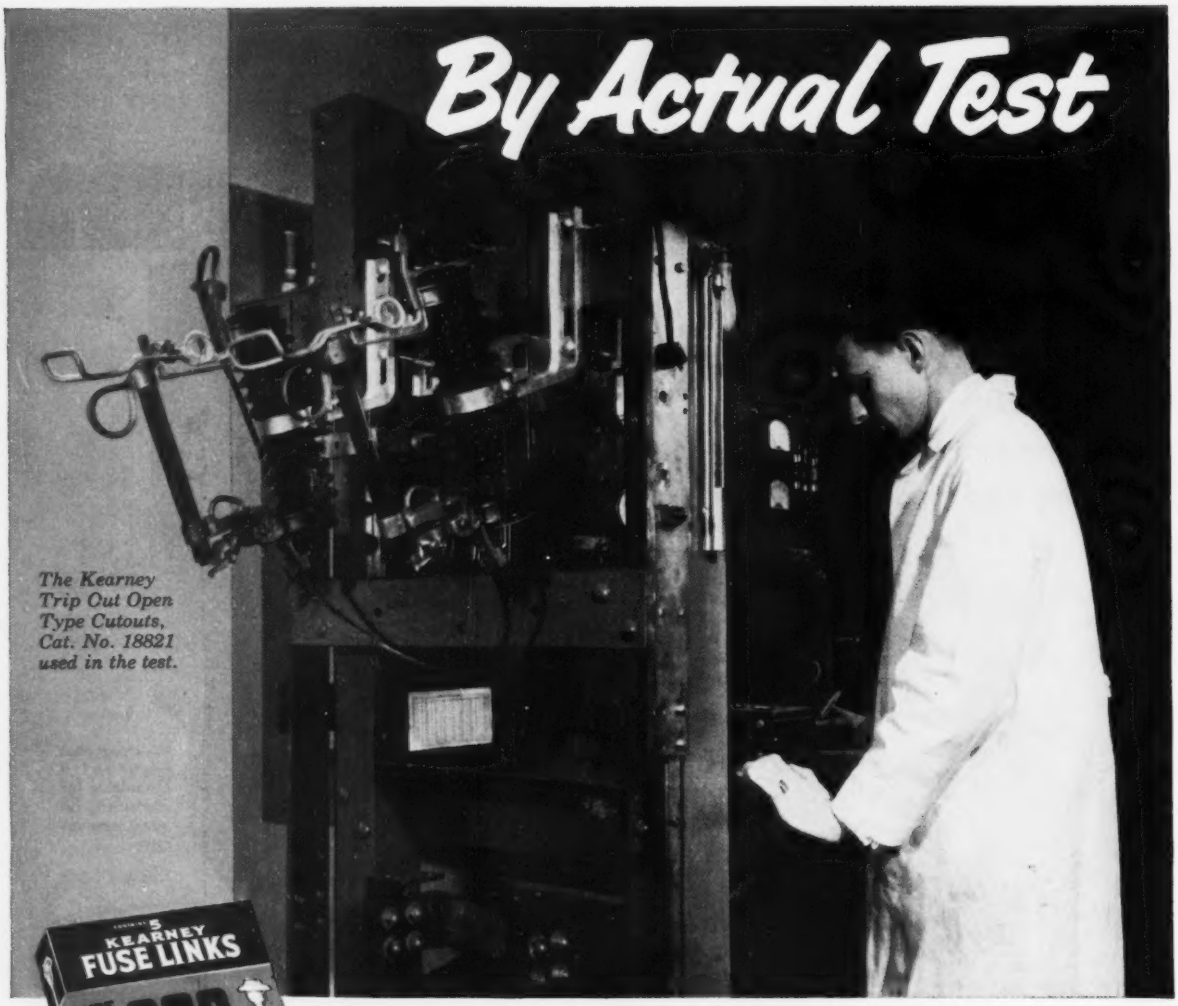
• Write for Sales Data Sheet #21253— 20

RUSSELL & STOLL COMPANY, INC. • 125 BARCLAY STREET, NEW YORK 7, N. Y.

RUSSELL & STOLL

PRECISION-BUILT ELECTRICAL EQUIPMENT—SINCE 1902

By Actual Test



The Kearney Trip Out Open Type Cutouts, Cat. No. 18821 used in the test.

Another Feature

HANDY PUL-TAB FUSE PAK *Plus* COLOR IDENTIFICATION

The original Kearney protective packaging guards against fuse link damage. Individual waterproof bags prevent tangled wires, make fuse handling easy. To get the right link at the right time simply grasp the clearly marked tab and pull.

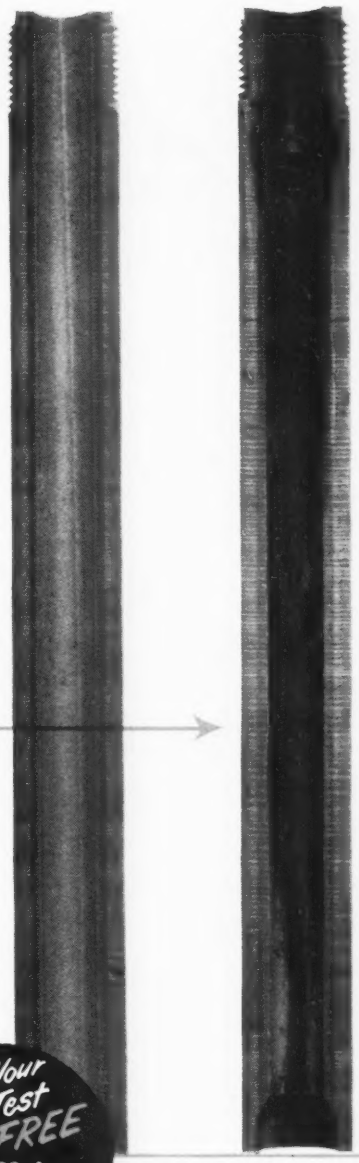
Another Kearney first, Color Identification, eliminates fuse link confusion. Each type of Kearney Fuse Link is packaged in a carton printed with its own distinct color combination. This extra feature makes identification almost automatic, prevents errors in reading labels.

Specify **KEARNEY**

KEARNEY FUSE LINKS

Prevent Fibre Damage

This simple test proves that Kearney Low Temperature Fuse Links give better system protection. Put a Kearney 100 ampere Type 200 Fuse Link in one cutout and any high temperature fuse link which has about the same continuous current carrying capacity in another. Pass 175 amperes through them for 1 hour and 50 minutes and then melt them with an increased load of 250 amperes. Now, let's look at the results.



LOW TEMPERATURE →

This unretouched photograph shows the interior of the cartridge fused with the Kearney Fuse Link. Note the absence of any charring or burning. Original arc extinguishing properties remain unchanged; cartridge could stay in service indefinitely.

HIGH TEMPERATURE →

This is the tube used with the high temperature fuse link. Look how most of its surface has been deeply burned, seriously reducing its arc extinguishing ability. This cartridge obviously should be replaced immediately.

WARNING: How many of your cutout cartridges are in this dangerous condition? If you have been using high temperature fuse links and have normal service overloads such as described above, then chances are that most of them look like the tube on the right. Remember, you can't see the damage from the outside, but the charred fibre on the inside will fail to quench the arc on the next operation. Play it safe. For reliable, low temperature system protection, switch to KEARNEY FUSE LINKS.

Make Your Own Test **FREE**

One—100 Amp. Cat. No. 11100 Kearney Fuse Link

Gentlemen:

Send me a free 100 Amp. low temperature Kearney Fuse Link. I want to make my own test.

Name .....

Company .....

Address .....

City ..... State .....

Title .....

221

JAMES R. KEARNEY CORPORATION

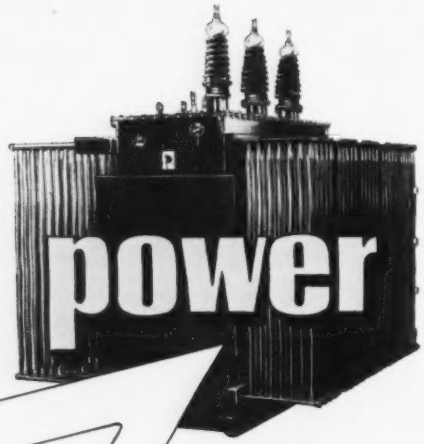
4224-42 CLAYTON AVENUE • ST. LOUIS 10, MISSOURI

Canadian Plant: Guelph, Ontario

PRODUCTS

for Better Construction — Safer Maintenance

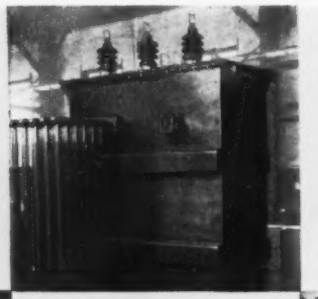
Uptegraff power Transformers



Long Life and Low Maintenance assured by important features of ***Design and Construction***

RUGGED

Special tank bracing withstands pressures of ±10 psi for ratings of 44 KV and less, and ±15 psi for higher ratings. Radiators are sturdy, yet accessible for cleaning and painting.

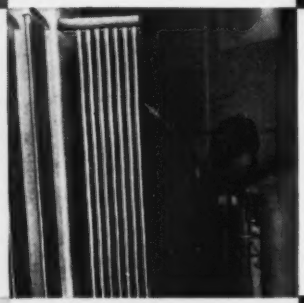


TIGHT

To eliminate leaks in sealed joints, a modern supersensitive electronic leak detector is used. It will find leaks as small as one ounce of air per year!

UNDERCOATED

The under surfaces of all Uptegraff Power Transformers are treated with a heavy coating that protects inaccessible areas against corrosion.

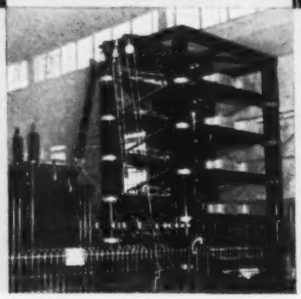


SHOT BLASTED

Tanks are thoroughly cleaned by shot blasting to prepare surface before protective paint coats are applied.

TESTED

Every Uptegraff Power Transformer is thoroughly tested before shipment. Modern test equipment includes a 1.5-million volt surge generator. We are fully qualified and equipped to make all NEMA, AIEE, ASA and other tests up to 10,000 KVA.

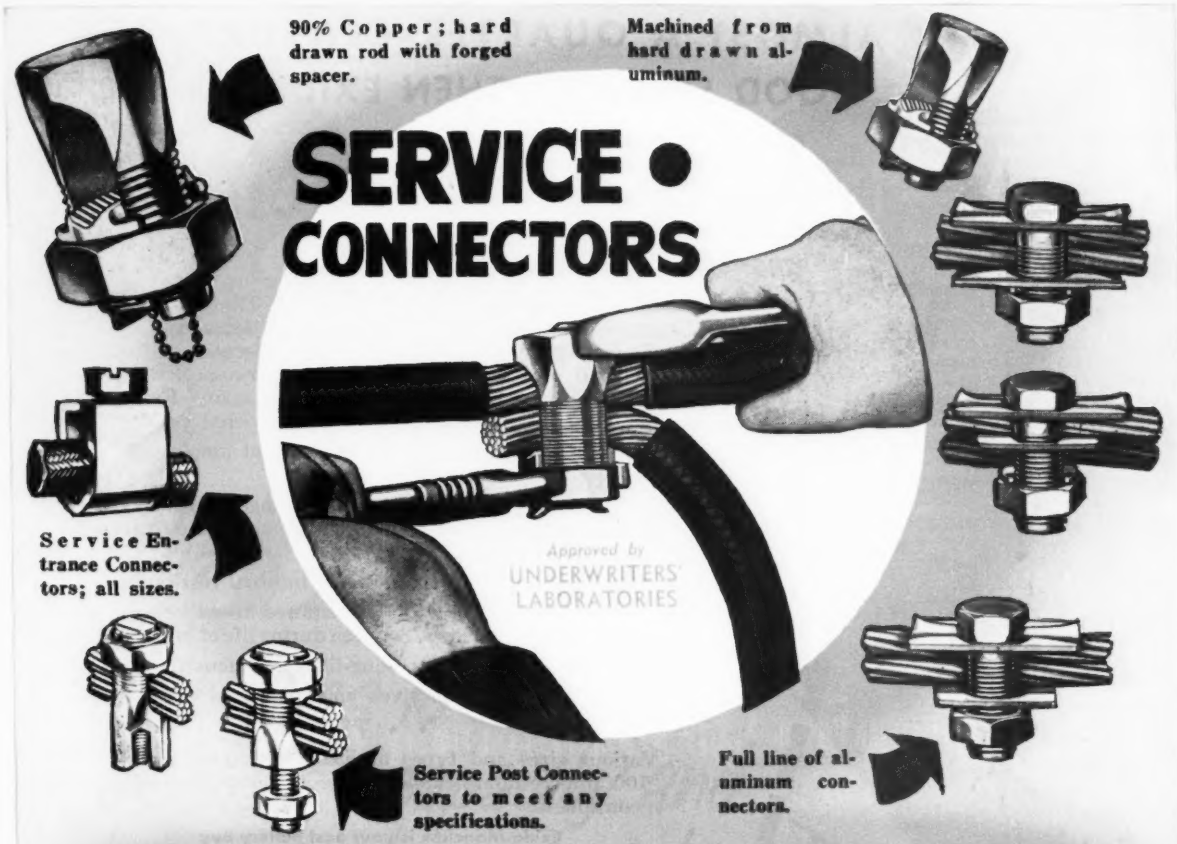


ALL SIZES

Made in sizes to 10,000 KVA, 115 KV for indoor or outdoor service. Oil or askarel filled. Uptegraff transformers meet the standards of ASA, NEMA and AIEE, and are *fully guaranteed.*

R. E. Uptegraff Manufacturing Co.

Scottdale, Pa.


90% Copper; hard drawn rod with forged spacer.
Machined from hard drawn aluminum.
SERVICE • CONNECTORS
Approved by UNDERWRITERS' LABORATORIES
Service Entrance Connectors; all sizes.
Service Post Connectors to meet any specifications.
Full line of aluminum connectors.

ALL TYPES and SIZES. Yoke-and-Nut Type, No. 10 to 1,000,000. Also Service Entrance, Service Post and Special Connectors (widest variety— more are shown below)

Penn-Union Service Connectors have accurate machine-cut threads, and carefully chamfered edges—do not catch in lineman's gloves.

Durable—re-usable over and over. Fully approved by Underwriters' Laboratories and the highest authorities in the utility field, for the most exacting service.

Penn-Union also makes the *complete* line of Tee Connectors, Cable Taps; Straight, Parallel, Elbow and Cross Connectors; Bus Supports, Clamps, Spacers; Ground Clamps, Terminal Lugs, etc., etc.

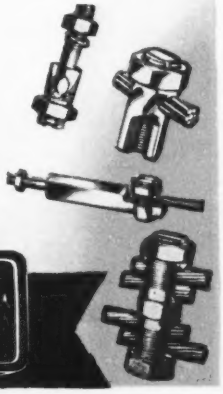
Leading users have found that "Penn-Union" on a fitting is their best guarantee of Dependability.

SOLD EXCLUSIVELY THROUGH WHOLESALERS

PENN-UNION ELECTRIC CORPORATION, Erie, Pa.

Canada: Dominion Cutout Company, Ltd.
250 Richmond St. West, Toronto

THE *COMPLETE* LINE OF CONDUCTOR FITTINGS



PENN-UNION

ALMOST A QUARTER-CENTURY OF GOOD SERVICE...THEN EXIDE AGAIN

Exide-Manchex BATTERIES

Little more than 4 per cent a year for depreciation! That's what it cost the Alabama Power Company for the Exide batteries installed in two of their substations 21 and 23 years ago. Because of this long-life record and continued good battery performance, when replacement time came 'round, it was Exide again—Exide-Manchex, the dependable, money-saving battery that assures:

POSITIVE OPERATION: Dependable performance at ample voltage with no switchgear failures.

INSTANTANEOUS POWER: High rates for switchgear operation with adequate reserve power for all other control circuits and for emergency lighting.

LOW OPERATING COST: Extremely low internal resistance.

LOW MAINTENANCE COSTS: Water required about twice a year. No change of chemical solution during life of battery.

LOW DEPRECIATION: Sturdy, long-life construction.

GREATER CAPACITY in a given amount of space avoids overcrowding.

• • •

Various sizes and types of Exide Batteries, up to 100 ampere hours capacity, are available in plastic containers.

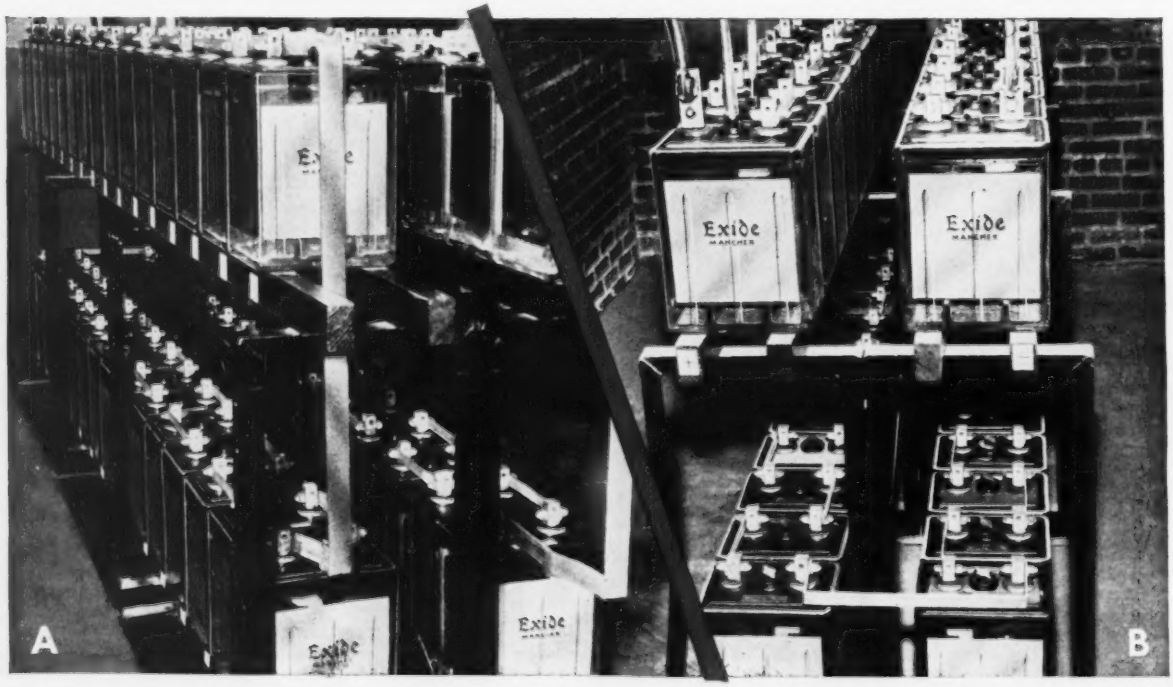
Exide-Manchex is your best battery buy for all control and substation services.

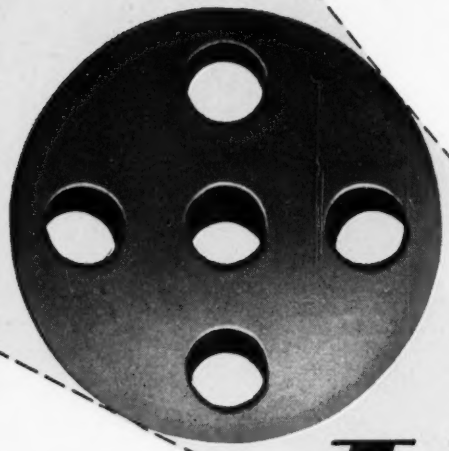
THE ELECTRIC STORAGE BATTERY COMPANY
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

1888...DEPENDABLE BATTERIES FOR 65 YEARS...1953

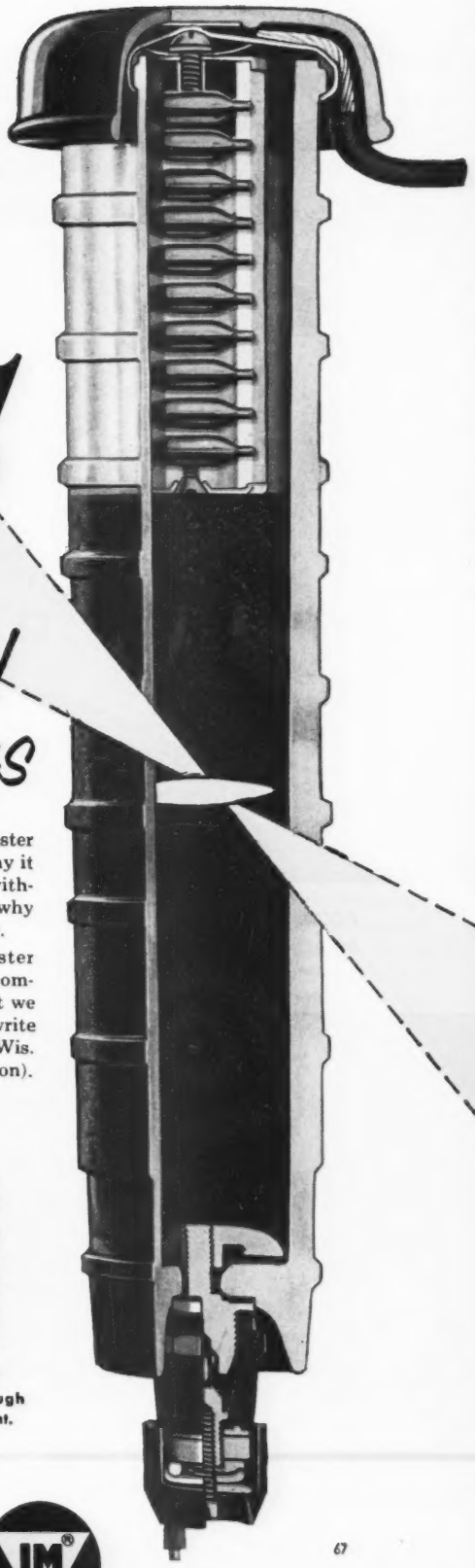
"Exide" and "Manchex" *Reg. T.M. U.S. Pat. Off.*

Installations of new Exide-Manchex batteries (65-cell EME-15) in substations of Alabama Power Company. (A) Magella Substation, Birmingham, Ala. (B) Bessemer Substation, Bessemer, Ala. Each installation mounted on two single-row, 2-tier racks.





the only lightning arrester with the LENS that gives it such high discharge capacity and unchanging characteristics



An ingeniously designed lens electrode is placed in the valve element of *every* L-M valve type arrester. This exclusive L-M feature performs an extremely valuable function that accounts for the exceptional performance and long life of L-M arresters.

Here's why. Lightning surge current tends to "skin" down the outside of the valve element, just as 60-cycle current will flow on the skin of a conductor. This results in only a small portion of the valve element being used to handle lightning surges. Thus the surge capacity of what might be a good arrester is materially lowered—the valve element will fail in time due to the excessive concentration of current on the outer skin.

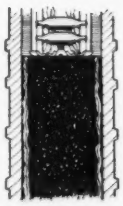
The L-M lens electrode completely counteracts lightning surge current "skin effect." The full cross-section of the valve element is available for extremely high surges—considerably in excess of 65,000 amperes.

The lens does the job. It distributes the surge evenly throughout the valve element—doesn't allow it to concentrate in any one path and thus clinker the element.

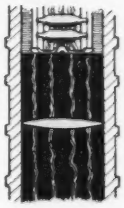
That's one reason why an L-M arrester can take more and heavier surges—why it maintains its high discharge capacity without change, for years and years . . . why its rate of failure is so gratifyingly low.

Get the whole story on L-M arrester performance, including some utility company records which substantiate what we say. Ask the L-M Field Engineer, or write Line Material Co., Milwaukee 1, Wis. (a McGraw Electric Company Division).

Here's What Happens



Without LENS
Surge channels down sides of element.



With LENS
Surge goes through the entire element.

LINE MATERIAL
Lightning Arresters

Complete Coordinated Equipment for Distribution Today

67

FIGURE 1—Earl J. Kirsch, Assistant Manager, Transformer sales, exhibits the L-M Round-Wound core-coil assembly, which provides an almost ideal magnetic circuit. The wound core has no air gaps; has stable characteristics, low exciting current. Long round coils wound directly onto the core encircle a large part of the core, making possible fewer winding turns and lower copper loss.

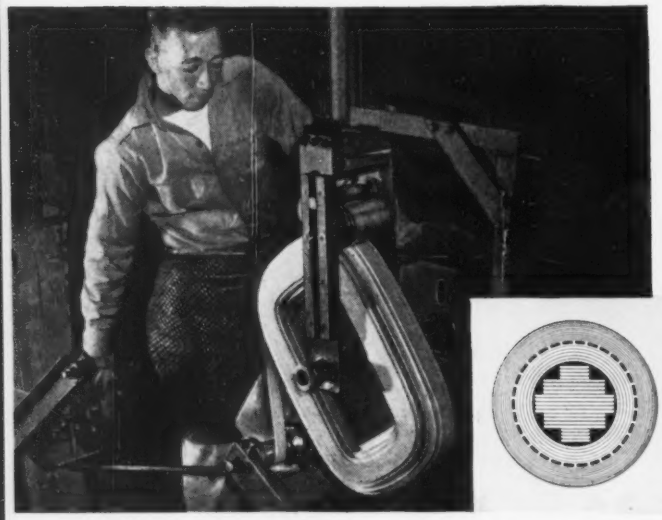


FIGURE 2—Core is tightly wound, under tension, of continuous strip of oriented silicon steel, of varying widths to provide a core of nearly round cruciform cross section.

FIGURE 3—The cross section of the wound core is cruciform, closely approximating a round form.

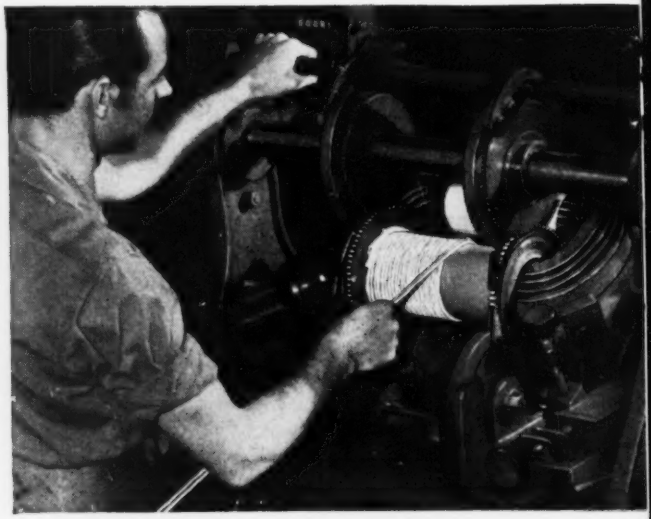


FIGURE 4—After the core is annealed, coils are wound directly on the *uncut* core, by means of split winding flanges driven by gears on the L-M exclusive winding machine.

How L-M Round-Wound Design Cuts Losses in Distribution Transformers

by **James G. Everhart,** Chief Engineer, Transformer Division, Line Material Company

Utility companies are under terrific pressure today between higher costs and higher taxes on the one hand, and lagging revenues on the other hand. Today, as never before, power must be distributed with the utmost economy, and great attention is being devoted to the reduction of every possible loss.

Transformer losses are one factor that is receiving extensive study, by both the operating companies and the manufacturers.

In this economy drive, transformer loading is also receiving major attention, with a view to maximum utilization of equipment—and this introduces another factor into the study of losses.

The Battle for Savings

The ratio of losses of a distribution transformer affects overload capacity. The copper loss watts vary as the square of the overload. In comparing two transformers of identical physical proportions including coil cooling surface exposed to oil, it is obvious that the unit with higher copper loss has less overload capacity before damaging temperatures are reached than does the transformer with lower copper loss. This effect is further emphasized by the fact the high copper loss dictates a small unit with less surface.

Core loss, on the other hand, is something the utility company pays for 24 hours a day. Therefore the designer must take both core and copper losses into account in providing the best possible balance of performance characteristics.

Exciting current, another factor in operating cost, is deserving of attention, and should be reduced to whatever extent can be done by a design that does not at the same time sacrifice other performance characteristics.

"Balanced Performance"

To meet these considerations, transformer design must essentially be a series of compromises. The L-M Round-Wound transformer consists of a wound core, with long round coils wound directly onto the core (Figure 1). This construction offers certain inherent advantages which make it possible for L-M designers to minimize compromises and offer *balanced performance.*

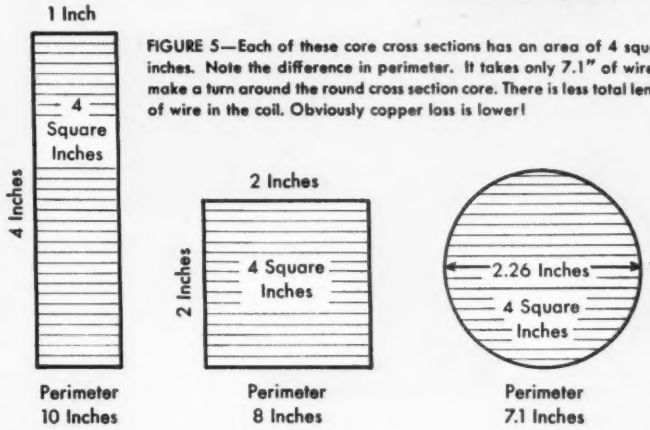


FIGURE 5—Each of these core cross sections has an area of 4 square inches. Note the difference in perimeter. It takes only 7.1" of wire to make a turn around the round cross section core. There is less total length of wire in the coil. Obviously copper loss is lower!

Wound Core Is Not Cut

First of these inherent advantages is the exclusive L-M wound core itself. It is tightly wound of continuous strip of cold rolled oriented silicon steel, with no cuts, laps, or gaps (Figure 2). This superior core makes possible the higher overload capacity and balanced losses of the Round-Wound transformer.

Lower Exciting Current

Since the core is not cut, no air gaps are created which would break up the flux path and produce higher exciting current, with consequent loss in revenue.

Low Core Loss

The higher magnetic efficiency of this core makes it possible to achieve low core loss easily, while the core at the same time contributes greatly to balanced performance. Incidentally, this continuous core is also far more quiet than one which contains air gaps.

Another advantage of the L-M wound core lies in the fact that the cross section is cruciform, approaching the round (Figure 3). Round coils are wound directly onto the core in an L-M designed winding machine (Figure 4). As shown in Figure 5, these coils allow a reduction in the perimeter of the coil and permit more efficient utilization of the copper. With the same cross section wire, and the same number of turns, there is less total length of wire, and less watts of copper loss. This is one of the inherent advantages of the L-M wound core that gives the designer more leeway in achieving a proper balance of performance characteristics.

Detailed typical performance characteristics of Round-Wound transformers are available from the L-M Field Engineer, or by writing Mr. Everhart at the Transformer Division, Line Material Company, Zanesville, Ohio (a McGraw Electric Company Division).

"Round-Wound" is a Line Material Co. trademark.

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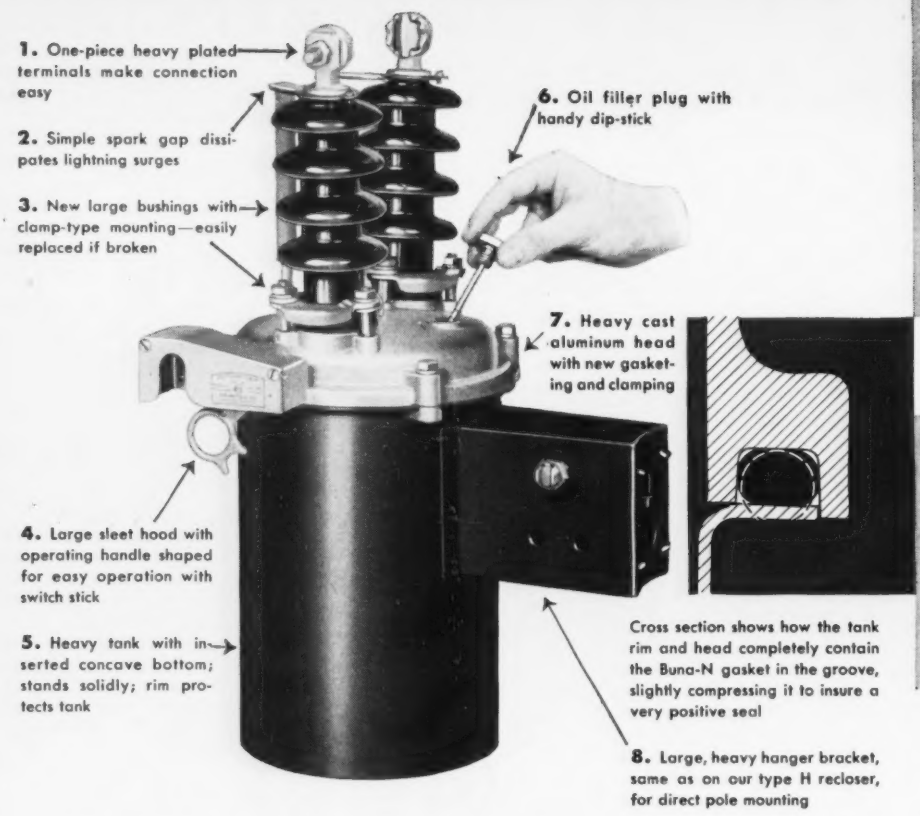
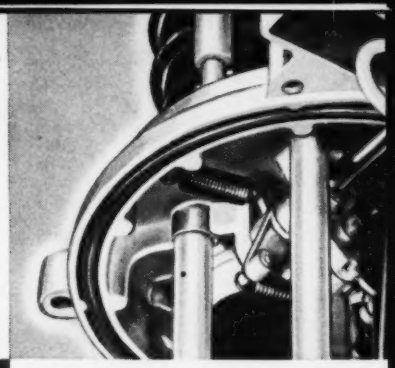
LINE MATERIAL **Transformers**

Complete Coordinated Equipment for Distribution Today


1. One-piece heavy plated terminals make connection easy
2. Simple spark gap dissipates lightning surges
3. New large bushings with clamp-type mounting—easily replaced if broken
4. Large sleet hood with operating handle shaped for easy operation with switch stick
5. Heavy tank with inserted concave bottom; stands solidly; rim protects tank
6. Oil filler plug with handy dip-stick
7. Heavy cast aluminum head with new gasketing and clamping
8. Large, heavy hanger bracket, same as on our type H recloser, for direct pole mounting

Cross section shows how the tank rim and head completely contain the Buna-N gasket in the groove, slightly compressing it to insure a very positive seal



Underside of head shows groove for gasket with lugs to retain gasket when head and mechanism are raised.

Bottom view of tank showing inserted bottom and heavy edge that assures stability on the ground and protects tank bottom against scratches.

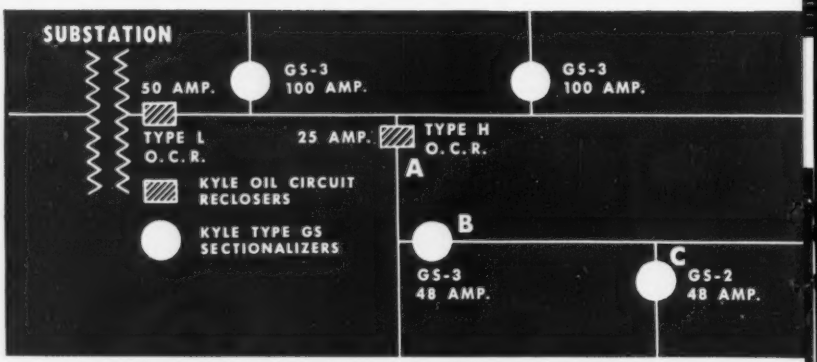
L-M's $47 Kyle® Type GS Sectionalizer Completes Your Automatic Protection

The Kyle Type GS Sectionalizer provides a means of automatically isolating faults on branch lines of a distribution system on which automatic reclosers are used.

Recent improvements illustrated above make the Sectionalizer more convenient to install and operate.

The Kyle Sectionalizer does not interrupt fault currents, but is set to open on a permanent fault, during the time that the recloser is open. It may be set to operate after the first, second, or third operation of the recloser, thus isolating the branch and permitting the recloser to reclose. Thus service is maintained on all but the branch with the fault.

By completing the chain of automatic protection, the Sectionalizer reduces service calls and eliminates fuse replacement; it eliminates the possibility of upsetting coordination by installing the wrong fuse; it provides greater safety when used as a disconnect, and when the line is re-energized after a fault has been corrected. And the low $47 price makes it an outstanding value.



Completely Automatic from Substation to Branch

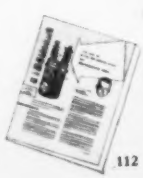
In the diagram, A is the recloser. B is a Kyle Sectionalizer set to open during the *third* operation of the recloser (indicated by GS-3). C is set to open after the *second* operation of the recloser. If a fault occurs beyond C, recloser A operates. If the fault doesn't clear on the first operation, the recloser opens again, and Sectionalizer C opens, isolating the tap. Then the recloser re-energizes the rest of the branch.

If a fault occurs *between* B and C, Sectionalizer C does not operate. But if the fault has not cleared by the third operation of the recloser, Sectionalizer B opens, isolating that branch. The recloser then re-energizes the rest of the line.

Other branches are also protected by Kyle Sectionalizers which are opened by the 50-amp type L recloser at the substation.

Get This New Bulletin

"Use of Kyle Sectionalizers on Distribution Lines" is a brief, clear presentation of the application and operation of Kyle Sectionalizers. Ask your L-M Field Engineer for a copy, or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Div.).



112

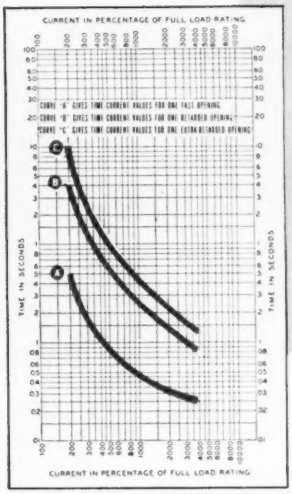
LINE MATERIAL
Kyle® Sectionalizers

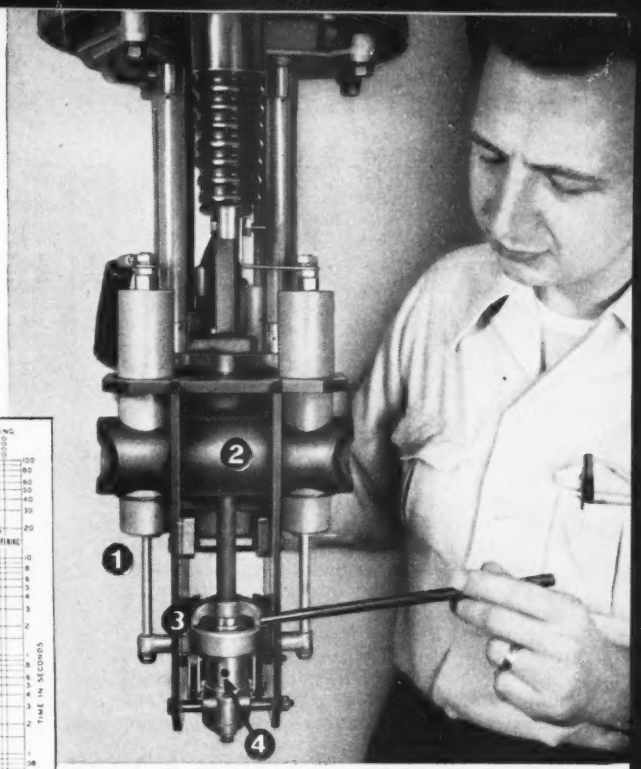
L-M's Kyle Type E 23 kv recloser outranks all others in its class for dependability, long service, low maintenance, and interrupting capacities. New higher interrupting capacity and 150 kv BIL assure ample safety factor.

"Universal" terminals for copper or aluminum conductor
Oil-filled clamp-on bushings—extremely low radio noise level
Heavy aluminum cover with operating handle, operations counter, and optional Kyle non-reclosing device lever under sleet hood
Heavy tank with welded bottom for better support, better protection
KYLE
ORTO

CHOICE OF SEVEN SEQUENCES

Only Kyle reclosers offer choice of three time-current curves and seven standard operating sequences. Curve A, fast; curve B, retarded; curve C, extra-retarded. Permits close coordination with fuses and other reclosers in series.





Oil cross blast arc extinguishing mechanism. The contacts of finest arc-resisting material (1) draw two arcs in series. Gas formed by one arc blasts the oil in the cross-blast chamber (2) across the other arc, extinguishing it instantly. The engineer points to the contact buffer mechanism (3), which permits varying contact opening speed by means of a removable plug (4). This insures best interrupting performance at both 23kv and up to 14.4 kv.

L-M's KYLE Type E 23 kv Recloser Now Interrupts up to 1750 Amperes at 23 kv

To meet heavier load requirements, interrupting capacities are increased to 2500 amperes at 14.4 kv, 1750 amperes at 23 kv. Provides full 150 kv BIL insulation, giving greater insulation safety factor with longer life. For all distribution voltages from 2.4 to 23 kv.

The heavy insulation and the improved oil cross blast method of arc extinction make the Type E an outstanding recloser for high voltage application, and provide an intermediate duty recloser up to 14.4 kv.

Oil-filled clamp-on bushings provide radio noise level well below NEMA standards. Plated Universal terminals for either copper or aluminum conductor. The recloser is available with a choice of eight coil ratings, three time-current curves, and seven tripping sequences. Coils and sequences are easily changed *in the field.*

Like all Kyle reclosers, the Type E is filled with ORTO®, L-M's oxidation-resistant transformer oil.

Get details on this exceptional recloser, which has proved so successful in service. Ask the L-M Field Engineer for copy of bulletin on the Kyle Type E, or write Line Material Co., Milwaukee 1, Wisconsin (a McGraw Electric Company division).

Type E Single Phase
Nominal Rating 23 kv, BIL 150 kv

Rating Amperes	Minimum Tripping Current Ampere	Interrupting Ratings* Symmetrical RMS Amperes at Maximum Phase to Phase Nominal Voltage of: 14.4 kv	23 kv
5	10	200	125
10	20	400	250
15	30	600	375
25	50	1000	625
35	70	1400	875
50	100	2000	1250
70	140	2500	1750
100	200	2500	1750

*Recloser interrupting ratings are based on the maximum test circuit X/R ratio of not less than 8, and the asymmetrical rating in total RMS amperes is 1.4 times the symmetrical ratings given in the table.

LINE MATERIAL
Kyle® Reclosers

Research... cornerstone of advanced instrumentation

RESEARCH is a job that never ends. This holds particularly true in the field of instrumentation, for every advance in manufacturing procedures brings a demand for better techniques for measurement and control.

But research, to fulfill its true function, must do more than keep pace with progress. In Honeywell's Industrial Division, research points far beyond today's frontiers. Here, skilled scientists are intensively engaged in programs that are developing solutions not only for present problems, but also for the much more demanding applications of the future. Drawing on the related sciences of physics, electronics, metallurgy, chemistry and nucleonics, they are helping to bring instrumentation into its own as a new and essential science. Fundamental research, which attacks control problems in their most basic aspects, is supplemented by development studies to evolve practical equipment for factory use. Working in close cooperation with research, Honeywell application engineers translate new developments into working systems, custom-fitted to today's process requirements.

Covers all phases of control

Each of Honeywell's several laboratories works in specialized but related phases of instrumentation.

The primary elements laboratory, for example, searches into ways to improve the performance of today's elements—and to utilize the latest scientific discoveries in producing new detecting devices with greater range, speed, flexibility and accuracy.

In the precision measurement laboratory, Honeywell's own "Bureau of Standards" performs the most exacting electrical and mechanical measurements to provide precise evaluation of new developments.

The nuclear engineering laboratory develops specialized techniques of measurement and control essential to the nation's accelerated atomic energy program.

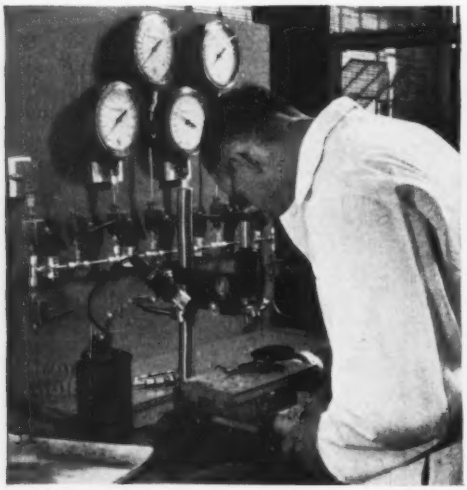
The servomechanisms laboratory studies the techniques which will be needed to control the "automatic factory" of the future . . . operates processes in miniature, and analyzes their control performance.

What of tomorrow?

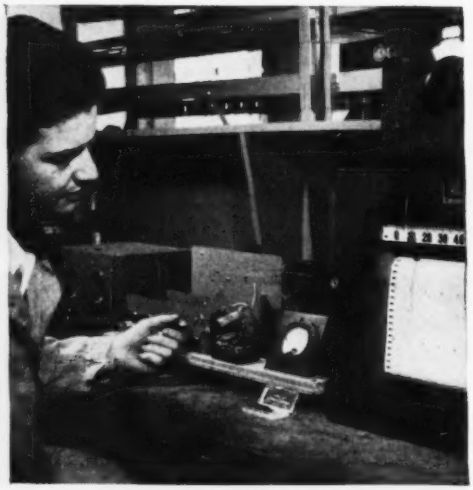
To the instrument user—in factory or laboratory—Honeywell's research has twofold significance. It assures continued refinement of instrumentation for the measurement and control work that's to be done today. And it promises new and revolutionary equipment from Honeywell . . . "First in Controls" . . . for the increasingly important role that instrumentation will play in tomorrow's world.

Guard against

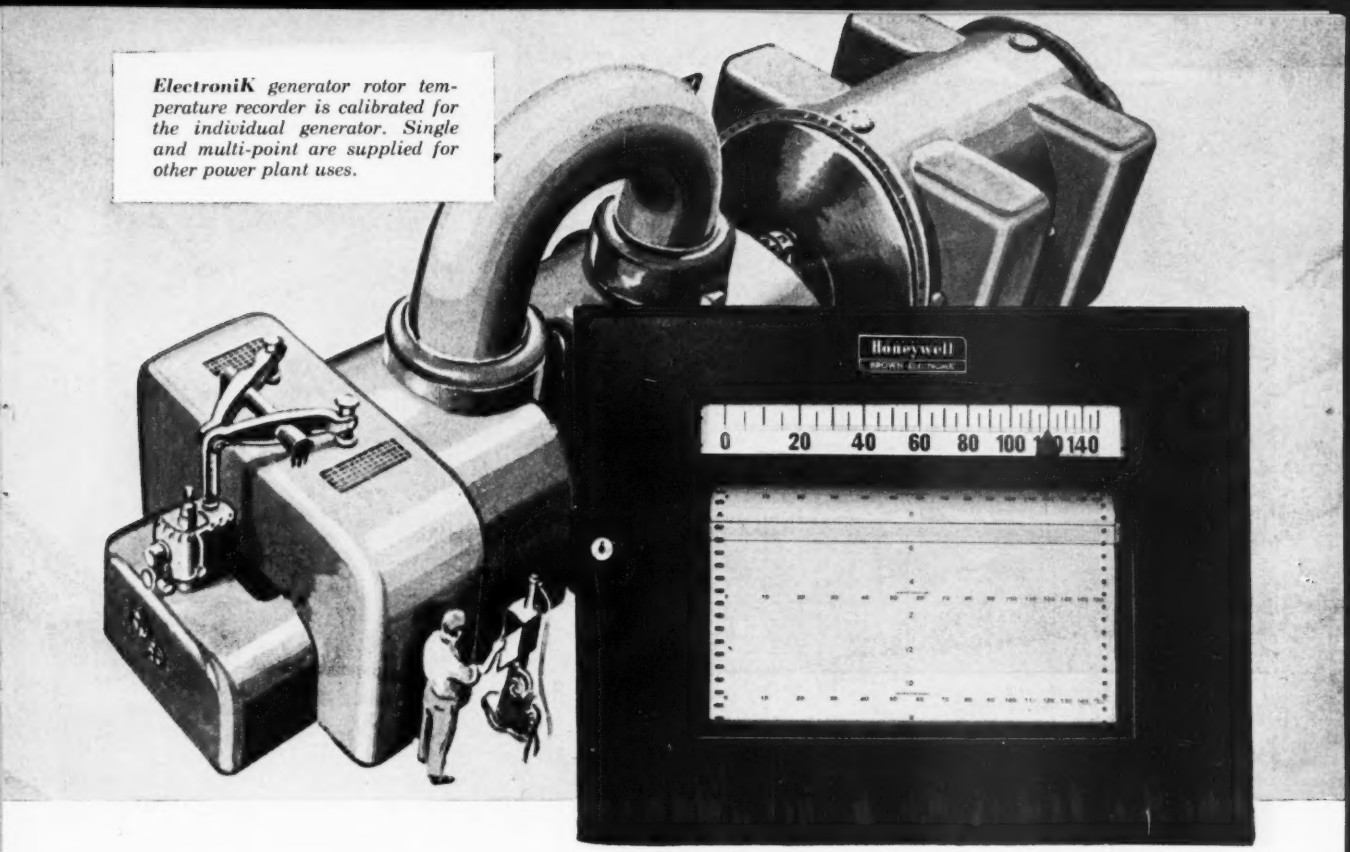
with



PRECISION MEASUREMENTS *aid study of new pressure measuring elements.*



NEW CONTROL TECHNIQUES *are developed in the servomechanisms laboratory.*



ElectroniK generator rotor temperature recorder is calibrated for the individual generator. Single and multi-point are supplied for other power plant uses.

overheat damage

ElectroniK temperature recorders

WHEN overloads pile up, wattmeters won't tell you how close temperatures are getting to the safe limits for insulation. But *ElectroniK* temperature recorders will. They're the best insurance you can have against overheat damage. They tell operators not only how hot the critical spots are at any instant—but also how fast temperature is rising toward the danger point.

ElectroniK recorders are supplied both for rotor and for stator temperature measurements in generators . . . and for countless other power plant temperatures in hydrogen coolers, transformers, cables, cooling oil and bearings. All operate on the "Continuous Balance" principle . . . are free from the limitations of delicate mechanical linkages.

Service-proved in thousands of installations across the breadth of industry, these instruments feature thorough dependability. Every component is built for long, trouble-free operation and minimum maintenance.

Your local Honeywell engineering representative will be glad to discuss advanced *ElectroniK* temperature instrumentation for your power plant. Call him today . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4568 Wayne Ave., Philadelphia 44, Penna.

• **REFERENCE DATA: Write for Data Sheet No. 9.1-7 . . . and for Catalog 90-2, "Supervisory Instruments for Power Generation."**

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

New International R-120 Series with special service-utility bodies. GVW ratings from 5,200 to 6,200 lbs. 115 and 127 inch wheelbases.

NEW INTERNATIONAL TRUCKS

BUILT as only IH can build them

The 168 basic *New* International models embody the engineering principles, used in International's continuing program of truck research and development, that have resulted in hundreds of exclusive International features that have meant greater profits for truck buyers.

PROVED as only IH can prove them

The 307 features in the *New* International Truck line have been *proved* in the world's most advanced Truck Engineering Laboratory; *proved again* at International Harvester's 4000-acre desert Proving Ground at Phoenix, Arizona.

VALUE only IH can give you

The *New* International Trucks offer an unmatched combination of values—the right truck for the job, unequalled performance, lowest maintenance and operating costs, maximum driver comfort.

Now—the features you want—
in *America's most complete truck line*

New International styling identified by the IH emblem . . . **Exactly the right power** for every job. First truck builder to offer choice of gasoline or LP gas with Underwriters' Laboratories listing in 1½-ton sizes and other models . . . **Designed by drivers for drivers.** Comfo-Vision cab with one-piece Sweepsight windshield. New comfort and interior styling . . . **Steel-flex frames** proved best in the field . . . **Transmissions** to meet any operating requirement . . . **296 Wheelbases** ranging from 102 inches up . . . **Easy starting and greater fuel economy** . . . **Wide range** of axle ratios for all models . . . **Real steering comfort and control** . . . Sizes from ½-ton to 90,000 lbs. GVW rating. Now—See The New IH-Built, IH-Proved International Trucks at your nearest International Dealer or Branch.

INTERNATIONAL HARVESTER COMPANY • CHICAGO

International Harvester Builds McCormick Farm Equipment and Farmall Tractors . . . Motor Trucks . . . Industrial Power . . . Refrigerators and Freezers

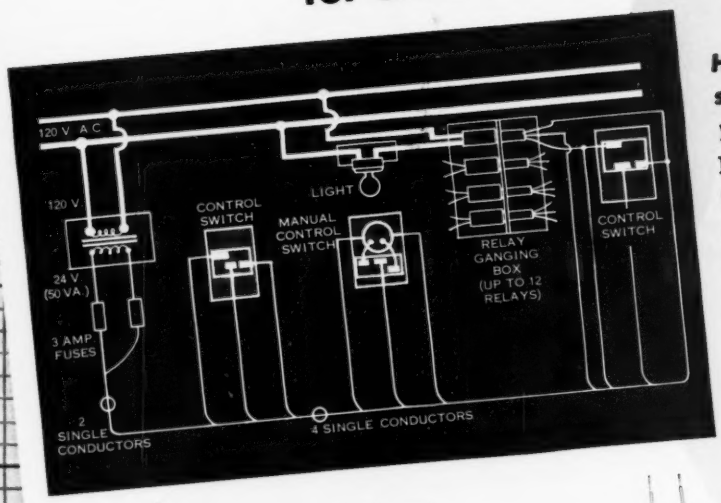
Better roads mean a better America

INTERNATIONAL TRUCKS

"Standard of the Highway"

The Swing is to LOW VOLTAGE CONTROL

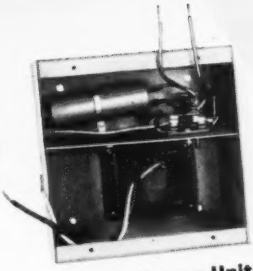
. . . and you'll prefer SQUARE D for a lot of reasons



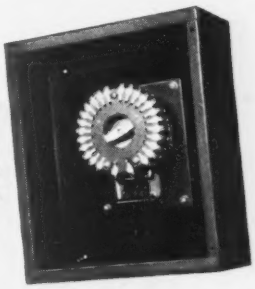
Here is a low voltage remote control system with all the features you've wanted . . .

Because it saves so much installation time, the cost of this very flexible system compares favorably with conventional systems. Actually less, in many cases. It offers a super-convenient means of switching lighting and appliance circuits. It has scores of applications—in homes, office buildings, schools, churches, warehouses, factories.

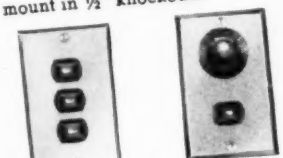
Relays are extremely rugged. 20 amperes, 120 volts A.C. Also 20 amperes, 277 volts A.C. for low voltage control of high voltage fluorescent lighting. All relays mount in ½" knockouts.



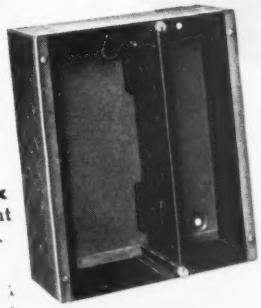
D.C. Power Unit, designed for consistent and trouble-free service. Eliminates A.C. hum.



Master Controller automatically controls up to 23 individual circuits from any location.



Control Switches are toggle type and fit Despard plates and straps. One, two, or three control switches (*left, above*) or one **Manual Selector Switch** and one control switch (*right, above*) can be mounted on a single strap. Manual selector switch controls from 1 to 9 circuits. Key-operated switch also available.



Relay Ganging Box for speedy, convenient and quiet installations.

Write *for Low Voltage Control Bulletin.*

Address Square D Company, 6060 Rivard Street, Detroit 11, Michigan.

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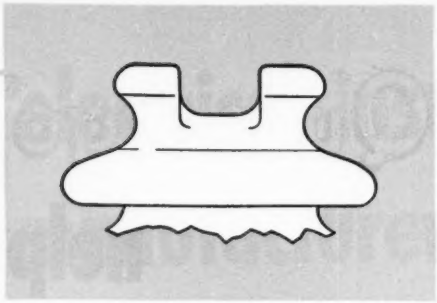
SQUARE D COMPANY

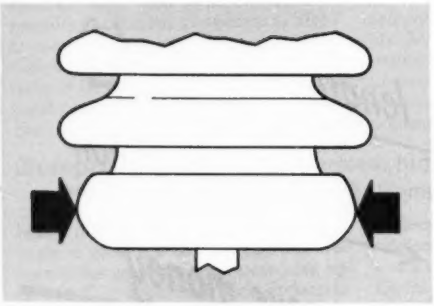
1903 · 50 YEARS OF DESIGN LEADERSHIP · 1953

Lapp LINE POST



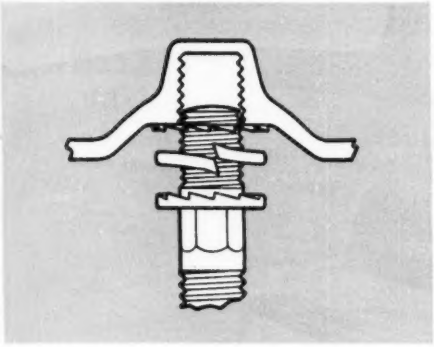
LARGER CONDUCTOR GROOVES

Improved wider square-side top-grooves—conforming to new EEI-NEMA standards—provides for conductor of any diameter up to 1½″. Holds conductor in top groove turning angles up to 15° (30° by using two insulators). With 45-Kv and smaller Line Posts, sharper angles may be turned by using side groove for conductor.



HARDWARE EXTERNALLY ATTACHED

Porcelain is approximately five times as strong in compression as in tension. In the Lapp Post design there are no nested porcelain parts or metal inserts which can load the porcelain in tension—or with any high-intensity local stresses. Hardware attachment is a cemented-on base, providing the safety of a large area, low-intensity compression grip.



INTERCHANGEABLE STUD BOLTS

Stocking problems are reduced with the Lapp Line Post. Separable 7″ (for wood cross arms) or 1¾″ (for metal mounting) studs—or special lengths on order—are interchangeable for all units, and may be installed in the field. Serrated surfaces in the base and stud flange engage a "positive" lock washer—when the stud is tightened into the base a vibration-proof attachment is assured.

LAPP INSULATOR CO., INC., LE ROY, N.Y.

This new booklet tells...

How *Quinterra*® and Quinorgo® help

This 32-page booklet is crammed with information to help you build better apparatus at lower cost. It covers the properties and advantages of Quinterra and Quinorgo in full detail with test data. Its clear construction drawings, plus case studies of leading apparatus manufacturers, show how to apply these insulations for maximum benefit. It also describes the never-before-advertised Quinterrabord, Quinorgobord and the new J-M laminates. To obtain this insulation handbook, call your local J-M sales office or fill out the coupon on the opposite page.

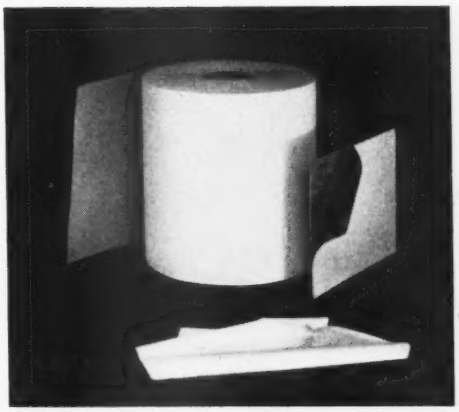
JOHNS-MANVILLE JM PRODUCTS

Johns-Manville ELECTRICAL

electrical insulations manufacturers reduce costs

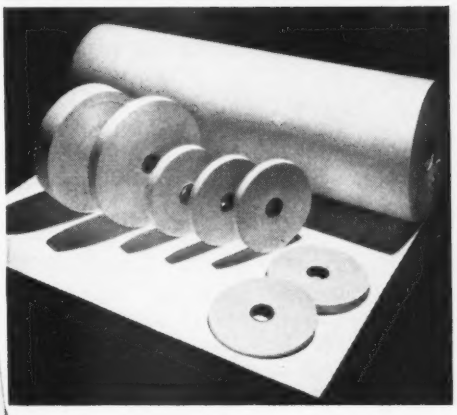
***Quinterra*—the pyrolysis-resistant dielectric that helps cut electrical apparatus costs.**

More and more manufacturers are using Quinterra to make apparatus smaller, safer and at lower cost. It permits equipment to operate at higher temperatures because it remains a dielectric despite heat and time . . . the bulk of its dielectric strength is in the purified asbestos base sheet. Its mechanical strengths, thinness and flexibility enable economical application. Its uniformity of caliper and texture allow dimensions to be predicted accurately and thereby speeds assembly. Moreover, Quinterra resists corrosion and humidity and is practically immune to fungus growth. Supplied in treated (Types 3, 5 and 6) and untreated (Type 1) forms.



***Quinorgo*—the moderate priced, high temperature insulation for use alone or in "composites"**

Many manufacturers find that Quinorgo is ideal for their purposes. Designed for operating temperatures up to 130 C, it combines high dielectric and mechanical strengths. High in absorptive capacity, it can readily be treated and combined with other dielectrics. Though a highly purified asbestos product, it does not have quite so high a pyrolysis resistance as Quinterra because a small percentage of organic binder is used in the base sheet. Quinorgo is furnished only in untreated form.



ACTUAL CASE HISTORIES
Maloney Cuts Eddy Current Losses With Quinterra
Acme Conserves Scarce Metals
Production Can Be Increased 33%
"Quinterra Easy to Apply," Jeffries Finds

Send for your free copy now

J-M's new 32-page booklet, "Pyrolysis Protection Pays Well," is offered without obligation to electrical equipment designers, engineers and manufacturers.

Johns-Manville, Box 60, New York 16, N. Y.
In Canada, 199 Bay St., Toronto 1, Ontario

Please send me without charge copy of booklet EL-40A "Pyrolysis Protection Pays Well"

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INSULATIONS

The Emblem Of Safe Insulating Oil Purification

The De Laval emblem identifies the De Laval Insulating Oil Purifier. It is the symbol of the ***safest*** means of maintaining transformer and circuit breaker oil. The reason is simple.

The De Laval Oil Purifier continuously discharges every bit of water that it centrifuges from the oil. Water that has been removed cannot suddenly recontaminate the oil. Therefore there is no chance that a batch of oil in process of being purified will go from a high to a low dielectric in an instant.

Action is both instantaneous and positive. The dielectric is restored in a single pass . . . making reruns unnecessary.

Speedy, dependable De Laval purification by De Laval Centrifugal Oil Purifiers leads directly to dependable substation performance.

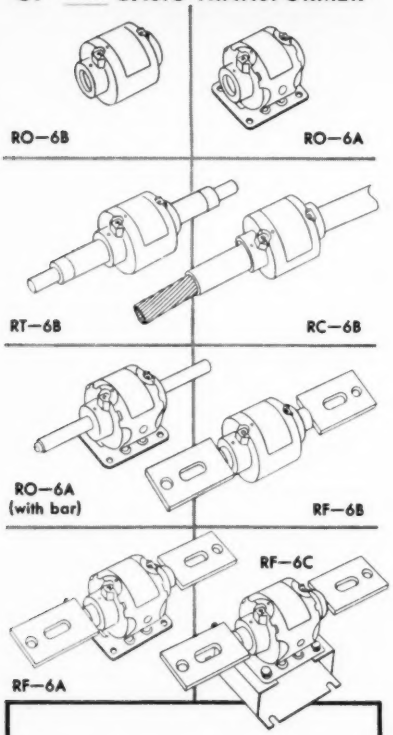
THE DE LAVAL SEPARATOR COMPANY

Chicago POUGHKEEPSIE San Francisco

DE LAVAL

INSULATING OIL PURIFIERS

EIGHT VARIATIONS
OF ONE BASIC TRANSFORMER



Sangamo Type R

Current Transformers

600 Volt—25/60 Cycle

These completely new current transformers lend themselves to a great variety of installations that help lower the overall cost of measurement of low voltage loads.

They are exceptionally small in size (the basic transformer is less than 4″ in length)—but meet the A.S.A. 0.3 metering accuracy classification for B-0.1 and B-0.2 burdens. They are so light in weight that good practice will be met even if they are supported by the primary conductor only. They have ratings of 200 and 400 amperes and have a current carrying capacity of twice their nominal rating.

Type R Transformers are encased in a bakelite shell filled with a thermo-setting plastic that eliminates all voids and prevents moisture from reaching the core or windings even when submerged.

The eight variations, shown at left, permit a variety of primary arrangements to meet almost any form of connection. This new type of transformer permits the engineer to use his ingenuity in devising cost cutting methods of installation. Full information is given in Bulletin 501. Write for your copy today.

SANGAMO
ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

Only Measured Facts are Known Facts

SM53-2

TRIANGLE'S Complete Line *plus* OVER 35 YEARS OF EXPERIENCE MAKES **THIS** EASY FOR YOU!

SPECIFICATION DATA SHEET
Interior Wiring Construction
Wire – Triangle – Cable – Conduit
Be sure all Wire, Cable, Conduit is Triangle
TRIANGLE CABLE
It MUST Be Right!

You'll like doing business with TRIANGLE

When you're working on the wiring spec sheet remember one word—Triangle—will take care of the vast majority of your needs. Triangle makes all three of the most essential paths for electricity—wire, cable and conduit including: Feeder Cable, Branch Circuit Building Wire, Service Entrance and Drop Cable, Power Cable, Varnished Cambric Cable, Neoprene Jacketed Cable for direct burial or aerial use, EMT, Rigid Conduit, Armored Cable—you name it, *Triangle, through its nationwide network of top distributors,* can supply it.

Ask your distributor about the advantages of buying all your wire, cable and conduit from the same manufacturer. Deliveries are surer, there's less paper work and you have a feeling of confidence right down the line.

Hundreds and hundreds of America's most important contractors, power companies and industrials always specify high quality Triangle—across the board.

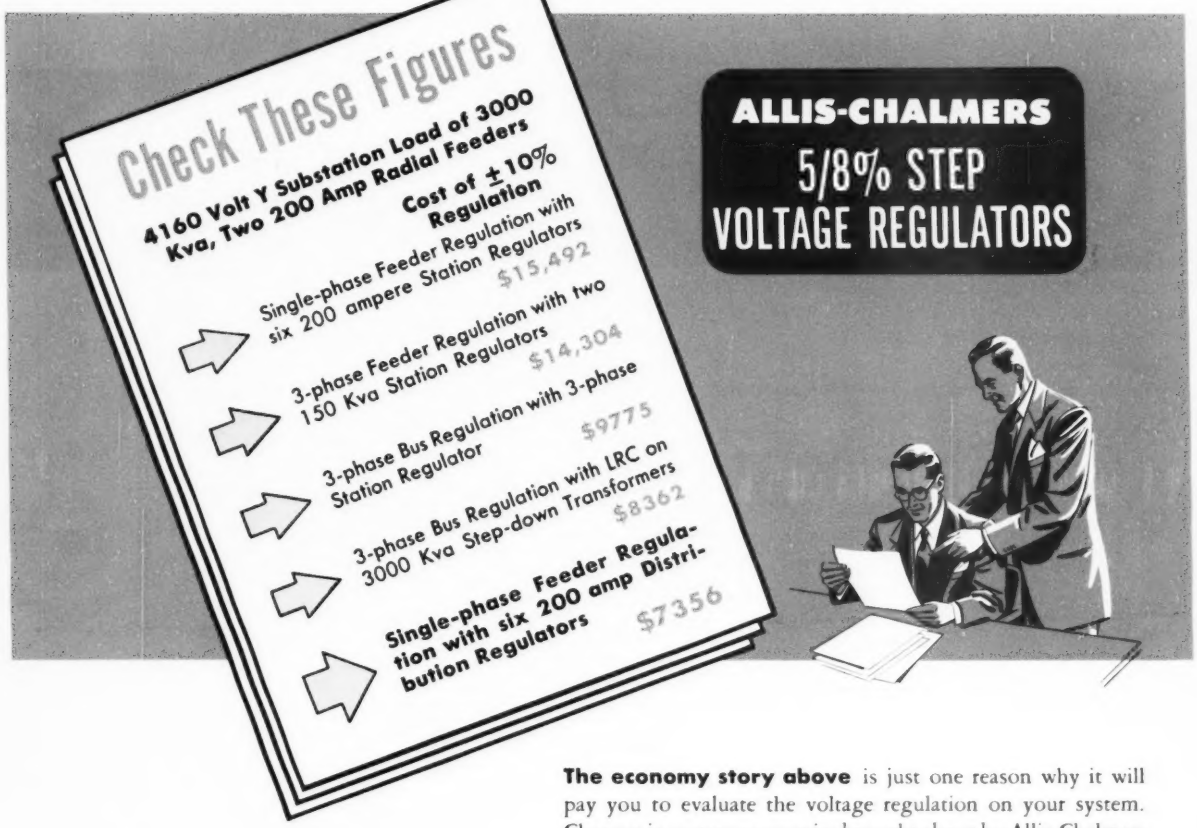
TRIANGLE
IT MUST BE RIGHT

TRIANGLE CONDUIT & CABLE CO., INC.

New Brunswick, N. J. • Moundsville, W. Va.

When it's a Question of Carrying Electrical Power—Specify **TRIANGLE**

Comparison Proves You Can Reduce Regulation Costs


Check These Figures
4160 Volt Y Substation Load of 3000 Kva, Two 200 Amp Radial Feeders
Cost of ±10% Regulation
Single-phase Feeder Regulation with six 200 ampere Station Regulators
$15,492
3-phase Feeder Regulation with two 150 Kva Station Regulators
$14,304
3-phase Bus Regulation with 3-phase Station Regulator
$9775
3-phase Bus Regulation with LRC on 3000 Kva Step-down Transformers
$8362
Single-phase Feeder Regulation with six 200 amp Distribution Regulators
$7356
ALLIS-CHALMERS
5/8% STEP
VOLTAGE REGULATORS

This Single Example Shows How You Save At Least

$1006.00

Over Previous Lowest Cost Equipment

The economy story above is just one reason why it will pay you to evaluate the voltage regulation on your system. Changes in system economics brought about by Allis-Chalmers distribution regulators may add up to better regulation and more profits for your system, too.

In many cases it is now possible to bring the advantages of single-phase feeder regulation to every feeder in a system. Both the utility and the consumer benefit. You'll get ± 1 volt accuracy, 20% range of regulation. You'll be able to increase revenue — and profits.

Get High Quality Regulation

Allis-Chalmers distribution regulators bring you all the advantages of 20 years of regulator progress. You get all the features that contribute directly to top quality regulation and long regulator life. You can read the full story — proof of quality and proof of the savings you can make — on the next three pages.

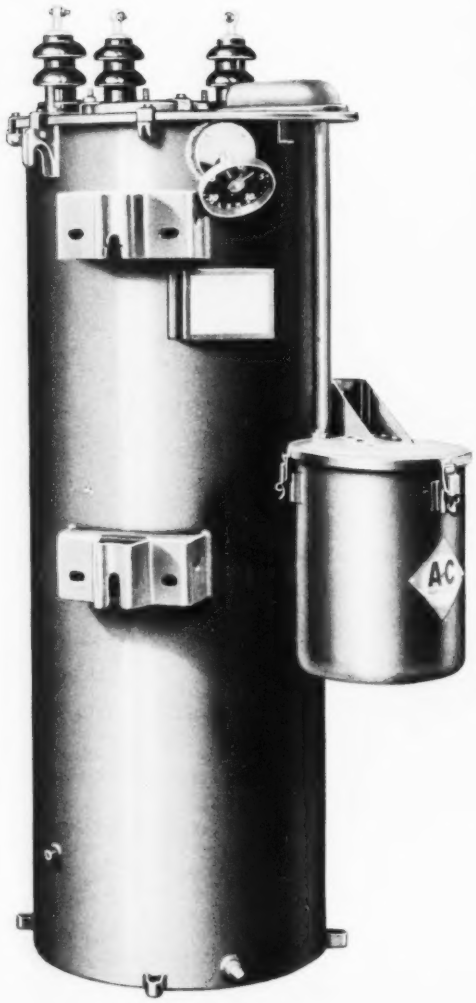
A4013

ALLIS-CHALMERS

Originators of 5/8% Step Regulation

The Modern Answer to a Wide

ALLIS-CHALMERS
Distribution Regulator
Sets Completely New Standard



You get the same high quality regulation from Allis-Chalmers distribution regulators as you get from station equipment and at lower cost. Twenty years of regulator development have resulted in a regulator that combines the advantages of mass production and simplification of parts with the elimination of features that do not directly contribute to regulation.

Result: you get the same ± 1 volt accuracy as in station regulators. You get the fundamental parts used in building larger regulators. And you pay only for what contributes most to your profits—accurate and reliable regulation.

Proved in Field Operation

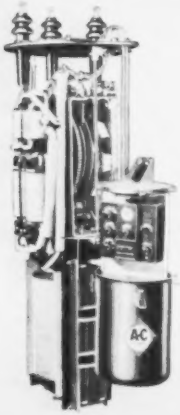
In addition to the years of research and development behind this rugged, compact unit, over eight years of field operation have proved that Allis-Chalmers distribution regulators will stand up under the toughest operating conditions.

Maintenance is Fast, Easy

An example of the simplicity of maintenance of Allis-Chalmers distribution regulators is provided in "Feather-Touch" control. The control can be removed and replaced merely by pulling a single jack plug. Your linemen don't have to be technical experts — it's easy to send control back to the shop for a checkup without interrupting service.

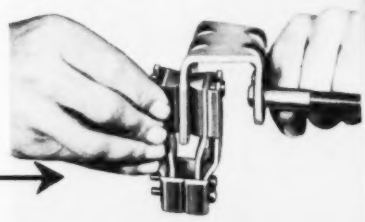
RATINGS AVAILABLE	*7620 Volts—15, 50, 100 amp* *5000 Volts—50, 100 amp* *2500 Volts—100, 200 amp*

Reliability Built In Through Advanced Design



Unit-Type Construction

High quality workmanship and thorough inspection of Allis-Chalmers distribution regulators can be guaranteed because unit-type construction permits making all connections before the unit is tanked. In addition, future inspection is easy because you can untank the unit without disconnecting leads or removing terminals. Transformer, tap-changing mechanism and control are cover-suspended.



Long-Life Contacts

Here's an example of the service you can expect from an Allis-Chalmers distribution regulator. These contacts will withstand two million operations — equivalent of 40 years of normal service life. The combination of strong spring pressure and arc-resisting material plus large dimensions means you'll have no contact troubles.

Variety of Regulation Problems

COST OF ± 10% REGULATION IN 12.47 KV Y DISTRIBUTION SUBSTATIONS

Load		3-Phase Bus Regulation		Feeder Regulation								
				One Feeder		Two Feeders			Three Feeders		
Kva	Amps	Transf. L.R.C.	3 φ Reg.	1 φ Station Reg.	1 φ Dist. Reg.	3 φ Station Reg.	1 φ Station Reg.	1 φ Dist. Reg.	3 φ Station Reg.	1 φ Station Reg.	1 φ Dist. Reg.
750	35	6027	6619	8400	4458	—	14382	5622	—	—	—
1000	46	6243	6619	8400	4458	13238	14382	8916	—	—	—
1500	69	6603	7084	10047	5871	13238	16800	8916	—	—	—
2000	93	7095	7549	10047	5871	13238	16800	8916	19857	25200	13374
2500	116	7639	9308	—	—	13238	16800	8916	19857	25200	13374
3000	139	8362	10118	—	—	14168	20094	11742	19857	25200	13374
3750	174	9403	11338	—	—	15098	20094	11742	19857	25200	13374
5000	231	11137	13326	—	—	15098	20094	11742	21252	30141	17613
6000	277	12596	14930	—	—	20236	—	—	22647	30141	17613
7500	347	14675	17338	—	—	22676	—	—	27924	30141	17613

COST OF ± 10% REGULATION IN 4.16 KV Y DISTRIBUTION SUBSTATIONS

Load		3-Phase Bus Regulation		Feeder Regulation								
				One Feeder		Two Feeders			Three Feeders		
Kva	Amps	Transf. L.R.C.	3 φ Reg.	1 φ Station Reg.	1 φ Dist. Reg.	3 φ Station Reg.	1 φ Station Reg.	1 φ Dist. Reg.	3 φ Station Reg.	1 φ Station Reg.	1 φ Dist. Reg.
750	104	6029	5647	4440	2979	—	7782	5958	—	—	—
1000	138	6243	6542	6645	3678	—	8880	5958	—	—	—
1500	208	6603	7152	7746	3678	—	8880	5958	—	—	—
2000	277	7095	8364	8760	—	13084	13290	7356	—	—	—
2500	346	7639	8931	11667	—	14304	15492	7356	16941	13320	8937
3000	416	8362	9775	11667	—	14304	15492	7356	19626	19935	11034
3750	520	9403	11028	13263	—	15506	17520	—	19626	19935	11034
5000	695	11118	13134	16377	—	17646	22458	—	23259	23238	11034
6000	834	12596	14813	18564	—	19550	23334	—	23259	29259	—
7500	1040	14675	17338	21879	—	22056	26526	—	26793	33687	—

Here's How to Figure Your Own Savings

The tables at left show how you can reduce the cost of regulation on your system by using low-cost Allis-Chalmers distribution regulators. They are two of the six tables that will help you evaluate this new development in terms of your own system's problems.

Additional Costs

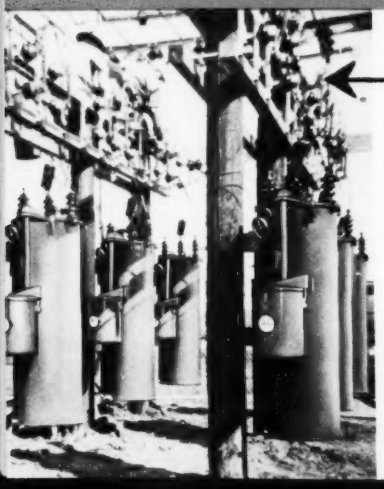
In addition, you'll want to analyze costs of installation and maintenance, too. At the bottom of the page you can see how easy it is to install Allis-Chalmers distribution regulators. You can eliminate foundations entirely by hanging them on poles. Or you may decide that conventional methods of installing regulators outweigh the advantages of placing them out near load centers.

Get Complete Set of Charts

The complete set of six charts for various distribution voltages is available. For your copy, write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-C ALLIS-CHALMERS

Install Them Anywhere



In a Substation

Allis-Chalmers distribution regulators can be installed together in a substation just like any other type of voltage regulator. Position indicators mounted near top of units are slanted toward ground so that they may be read easily either from the pole or from the substation.

On a Pole

Hanging Allis-Chalmers distribution regulators on a pole is easy. They have standard NEMA mounting brackets just like those used on distribution transformers. If desired, the control can be mounted at the foot of the pole for convenience in service. If control is mounted at top of pole with regulator, maintenance is easy because lowering control tank exposes entire control front and back.

Easy Installation Gives You Flexibility

Even after load conditions change, Allis-Chalmers distribution regulators can be moved to follow the load. They're so easy to install that shifting them to another feeder costs practically nothing.

You're Buying Voltage Insurance

In fact, you'll find a supply of Allis-Chalmers distribution regulators permanent insurance against low voltage. Their flexibility makes it possible for them to earn their keep many times over, not only on the first feeder you use them on, but on many other feeders as well.

Increase Feeder Revenues Now

It will pay you to get complete information about Allis-Chalmers distribution regulators immediately. Increased loads should provide proportionately increased profits. The way to assure these profits is to investigate Allis-Chalmers distribution regulators now and apply them where needed.

Get More Information

Call your nearest Allis-Chalmers district office now or write Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

Originators of 5/8% Step Regulation

Lowers Operating Costs

Steps up crew efficiency!

Powers-American bodies do their job faster, more efficiently, and at lower cost, because they're "*job-engineered.*" Each model incorporates design features *proved* by utilities over many years of operation, and is field-tested under actual working conditions by utility engineers *before* production! "*Job Engineered*" means long life and trouble-free service for you, whatever your utility body needs may be. Look to *Powers-American* as *your 1* source for *all* types of utility bodies and equipment.

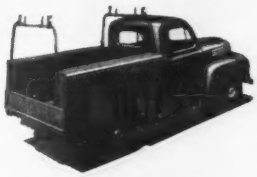
REVOLVING AERIAL LADDER

Can be extended to any length, spotted in forty positions throughout a full 360° revolution, and inclined at any angle from 30° to 75°. Easily operated by one man. Safe enough to support 4 times normal working load. Available in sizes having ground-to-platform heights from 23′ 6″ to 32′ 3″.

"The Accepted Standard with Utilities Everywhere"

HYDRAULIC TOWER

Available in models having ground-to-platform heights of 21′, 25′, and 30′, for installation on chassis having 1½ ton capacity or more.



GENERAL SERVICE BODY

½, ¾, 1, and 1½ ton models. Can be equipped to meet any operating requirement.

FORESTRY BODY

For tree trimming and clearing. Also available with winch and derrick for construction work.

LIGHT CONSTRUCTION BODY (350)

Fold-over derrick can handle poles up to 40′ in length. Underfloor winch leaves loading area clear.

POWERS American DIVISION

AC&B

PUBLIC UTILITY BODIES AND EQUIPMENT

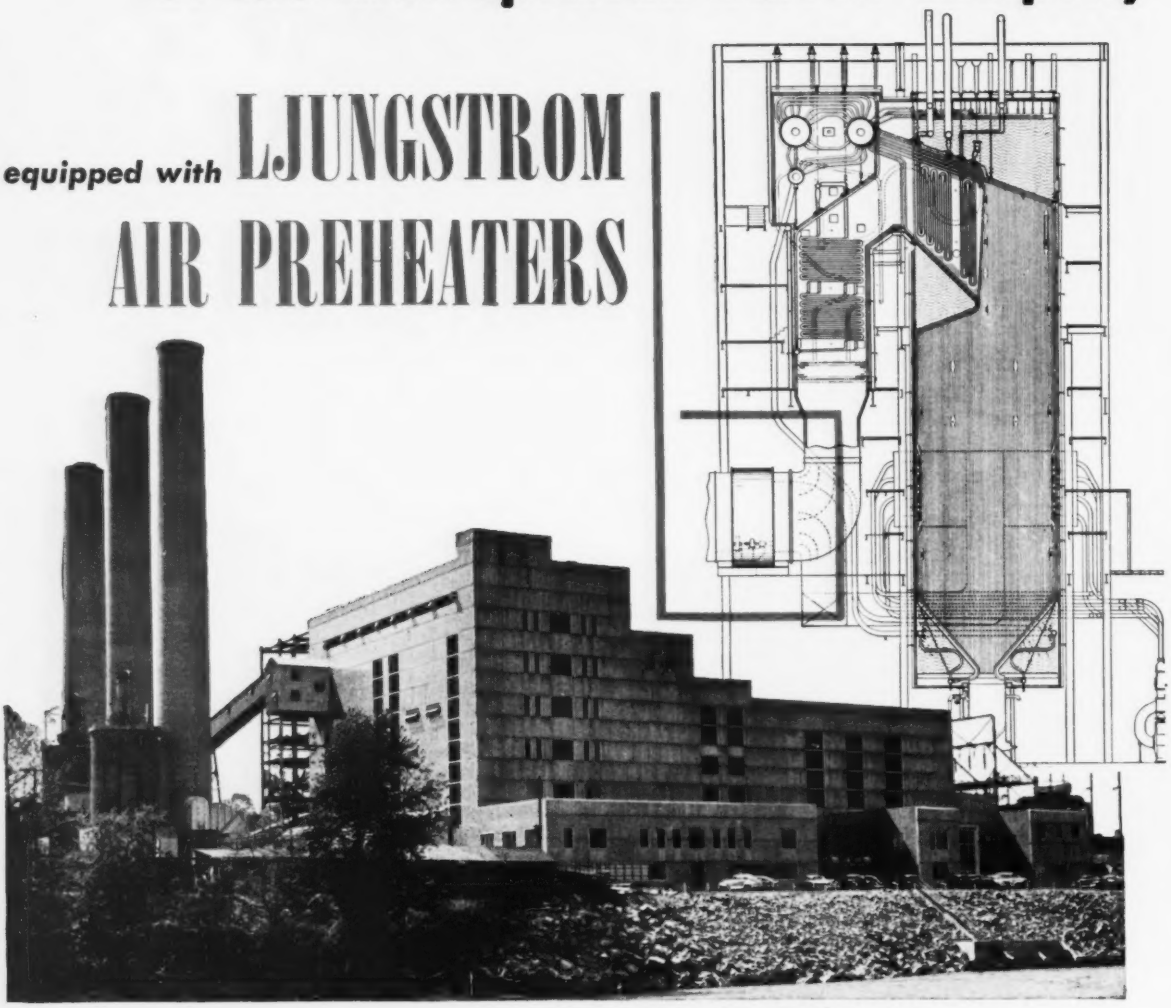
McCABE-POWERS AUTO BODY COMPANY

5901 North Broadway, Saint Louis 15, Missouri

There are many styles of *Powers-American* Bodies not shown here. Write for descriptive catalog today.

All three Boilers at New Titus Station of the Metropolitan Edison Company

equipped with **LJUNGSTROM AIR PREHEATERS**



Adding on completion 240,000 kilowatts to the output of the Metropolitan Edison Company of Reading, Pa., the company's new Titus Station is now in operation producing 160,000 kilowatts. Designed and constructed by Gilbert Associates, Inc., of Reading, Pa., Titus is expected to be in capacity operation early next year.

Steam for each of the two 80,000-kw turbine-generators now in service, and for the third, soon to go into service, is supplied by a Combustion Engineering–Superheater Boiler at 1450 psi and 1000 F, reheated to 1000 F. These C-E Boilers are pulverized coal fired.

Each Combustion Boiler has been designed to incorporate two Ljungstrom Air Preheaters which preheat incoming combustion air to 600 F, and cool exit gases to 280 F.

At Titus, as at scores of power plant installations across the country, once again the broad general acceptance of the Ljungstrom Air Preheater for top efficiency steam generating units is demonstrated. Ljungstroms placed in service or on order since 1945 alone — selected by every major boiler manufacturer, consulting engineer and utility — are serving boilers with an aggregate capacity of over 285,000,000 pounds of steam per hour.

THE Air Preheater Corporation 60 East 42nd St., New York 17, N. Y.

INSTALLED 1945

its field performance record speaks for itself!

An original C-D capacitor installation for a large midwestern utility performed so dependably and required so little maintenance that the utility has since followed it up with many additional Cornell-Dubilier installations.

A C-D engineer will be glad to show you how to get the most for your capacitor dollar. Cornell-Dubilier Electric Corp., Dept. D33, South Plainfield, N. J.

CORNELL DUBILIER

WORLD'S LARGEST MANUFACTURER OF

CAPACITORS

PLANTS IN SO. PLAINFIELD, N. J. • NEW BEDFORD, WORCESTER AND CAMBRIDGE, MASS. • PROVIDENCE, R. I. • INDIANAPOLIS, IND. • FUQUAY SPRINGS, N. C. • SUBSIDIARY, RADIART CORP., CLEVELAND, O.

6 Reasons why you get greater accuracy with Bristol Series 500

RECORDING VOLTMETERS AND AMMETERS

1. Low burden—the lowest burden of any round-chart recorder on the market.

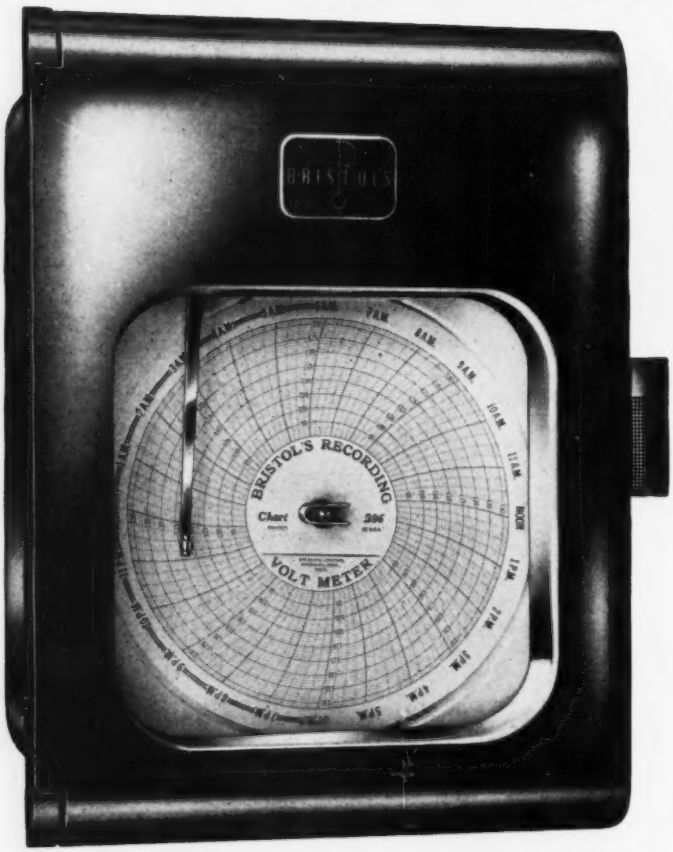
2. Extremely high torque gradient.

3. Temperature compensated.

4. Shock-proof moving element mounting.

5. Leveling of instrument not critical.

6. Continuously legible recording on sudden changes—up to full scale value.

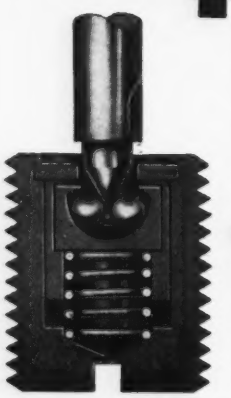


Bristol Recording Voltmeters and Ammeters use moving-iron measuring mechanisms, known for high torque . . . refined by Bristol engineers for greater accuracy and ruggedness.

Advances in electrical measurement naturally come from Bristol, experienced for nearly 60 years in building hundreds of thousands of recording voltmeters and ammeters for almost every application . . . the finest, most dependable products.

Series 500 Voltmeters and Ammeters are designed for easy use, with dust- and moisture-proof die-cast aluminum case; quick-set chart hub for easy chart changing; non-obscuring pen lifter; and snap-on chart plate.

Find out all about these superior instruments by writing for Bulletin E1111 to THE BRISTOL COMPANY, (116) Bristol Road, Waterbury 20, Conn.



Permanent mounting offered in three models: interchangeable surface and flush, surface-panel and flush panel. Note the pleasing, well-balanced appearance. Also, *portable instruments* are offered in two models: for setting on floor or table; for mounting on walls or poles and general service.

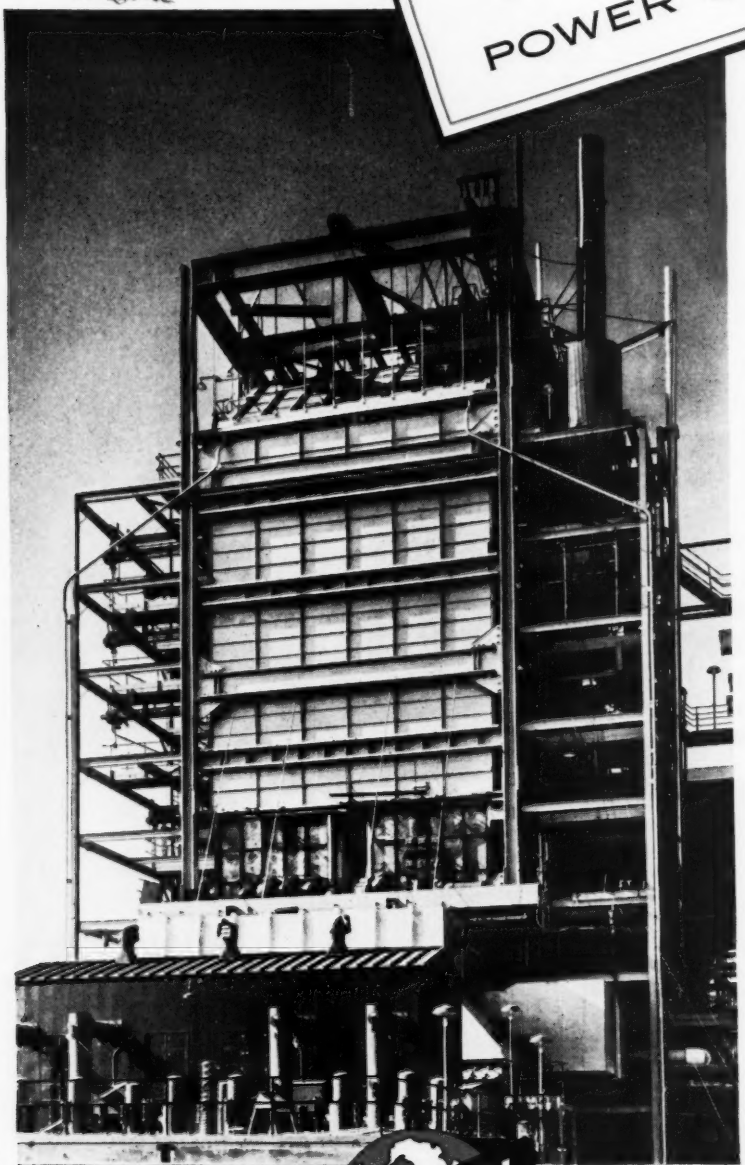
New ball-bearing suspension, loaded by a coil spring, prevents damage even under severe mechanical shock. Stainless steel bearings and shaft are almost tool hard and are corrosion-resistant.

BRISTOL

The dependable Guidepost of Industry

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

TO EXECUTIVES OF EXPANDING POWER SYSTEMS



YOUR COMPANY can make sure of facilities that are economical to build and operate—and like this Utah plant—provide for future expansion at moderate cost.

These characteristics of Bechtel design are paralleled by procurement and construction capacity geared to the delivery of an operating plant in the shortest possible time. Projects range from small installations to central stations rated at 600,000 kilowatts.

Your inquiry is invited.

Outdoor boilers, Gadsby Plant,
Utah Power & Light Company

BECHTEL

BECHTEL CORPORATION

BUILDERS FOR INDUSTRY

Los Angeles · **SAN FRANCISCO** · *New York*

FULL PAGE NATIONAL ADS...

...boost your Sylvania Fluorescent Lamp Business this Spring!

Again and again, Sylvania's hard-hitting TV-National Magazine campaign pre-sells Sylvania Fluorescent Lighting for *you*.

This coordinated campaign packs plenty of sock and follow-through. Millions of prospects will see and hear Sylvania's famous *better-performance guarantee* on the weekly "Beat the Clock" TV show over a nation-wide 42-station CBS hook-up.

Millions also will read this same amazing, money-back offer in full-page ads in *Time, Newsweek, Business Week,* as well as in *Factory Management and Maintenance, Textile World, Chain Store Age and other leading business publications.*

Don't pass up this profitable opportunity! Make sure NOW that you have plenty of Sylvania longer-lasting, guaranteed fluorescent lamps in stock. For further information, write today to: Sylvania Electric Products Inc., Dept. 3L-2703, 1740 Broadway, New York 19, N. Y.

This emblem appears in all Sylvania's national fluorescent lamp advertising. Urge all your Lighting Contractor friends to display it prominently.

QUALIFIED LIGHTING CONTRACTOR AUTHORIZED SYLVANIA SALES SERVICE

SYLVANIA

FLUORESCENT LAMPS, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; PHOTOLAMPS; TELEVISION SETS

Look!

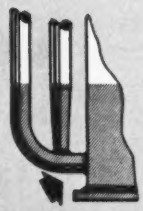
THIS TRANSFORMER BEATS CORROSION AND FLOODING

ALLIS-CHALMERS

NETWORK TRANSFORMERS

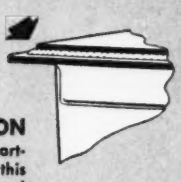
SPIRAL-WOUND GASKETS . . . Performance Proved

Spiral-wound bushing gaskets consist of alternate plies of preformed spring-like metal and nonmetallic fillers, providing resilience that maintains a leak-proof seal. The gasket adjusts itself to changes in operating conditions.



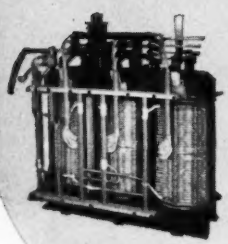
SPECIAL SURFACE TREATMENT

To provide high moisture resistance there's grit blast cleaning plus three coats of baked-on phenolic paint. Added to this is a special coat of bituminous compound that covers surfaces and cooling tubes in the base areas.



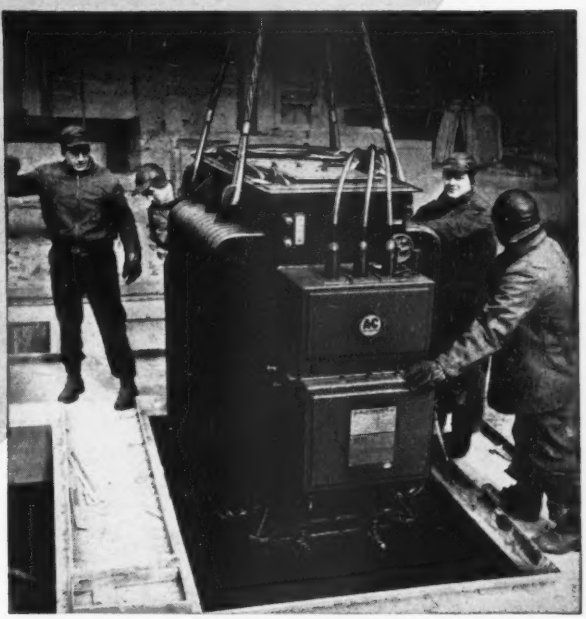
WELD SEAL CONSTRUCTION

The main cover and switch compartment are welded to the tank. In this way gasketed joints are eliminated . . . preventing breathing, extending insulation life and reducing requirements for filtering.



HIGH THERMAL CAPACITY

Characteristic of this compact low-loss design are the high thermal capacities for severe load conditions. Sturdy, time-proved core and coil construction is built to meet repeated short circuit stresses of network operation.



This 500-kva sealed network transformer is one of ten Allis-Chalmers network transformers serving the new Gateway Center in Pittsburgh. Accessories are located for maximum convenience.

NO DOUBT ABOUT IT! Underground vault conditions are rough. But Allis-Chalmers network transformers are specially designed for such underground service.

They're built to withstand flooding and complete submersion in water. Their surface is protected against the effects of industrial gases, dust, salt, rain or mild atmospheric acids. As electric utilities' operating records show, they supply the continuous energy necessary for health and safety in your city.

SERVICE RELIABILITY SAVES MONEY

Stability for dense load areas, improved voltage regulation, elimination of costly substations and hazardous overhead lines — these are but a few of the important benefits of network systems. They are brought out best over a long period of time with A-C network transformers.

You'll find your every day requirements are successfully served by these *standard* designs: oil-filled, *Chlorextol* liquid filled or sealed dry-type. So if you're planning to expand your network system you can select the specific Allis-Chalmers transformer best for your system.

For more information about this standard line of network transformers write Allis-Chalmers, Milwaukee 1, Wisconsin, or get in touch with your nearby A-C district office. A-3921

Chlorextol is an Allis-Chalmers trademark.

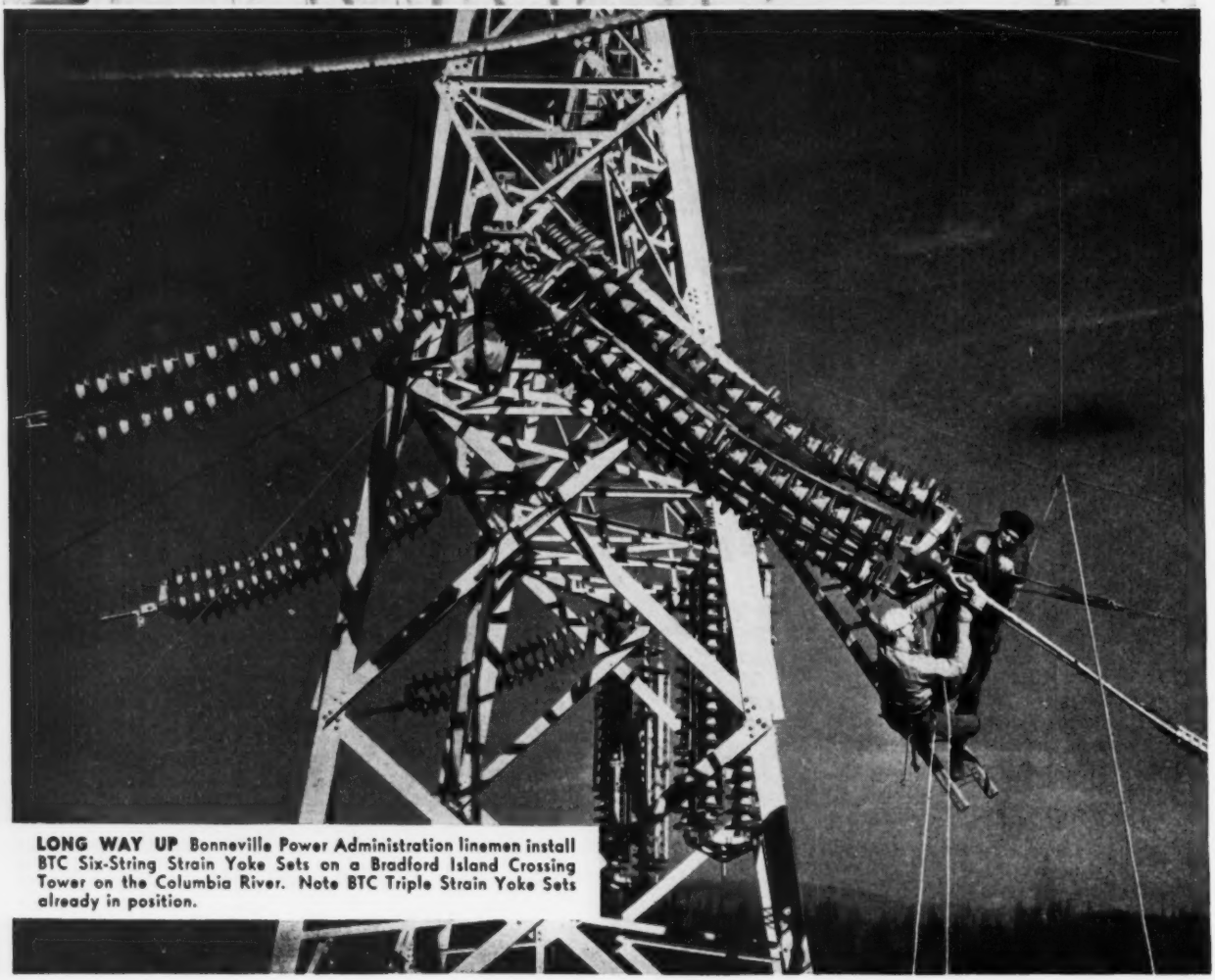
ALLIS-CHALMERS A-C ALLIS-CHALMERS

POWER...

This 2[illegible] kv line spans the Columbia River below Bonne[illegible]le Dam to carry power to Vancouver, Wash. Stret[illegible]ng across rough foothills flanking the river's cours[illegible]it is one link in Bonneville Power Administ[illegible]tion's [illegible]etwork of lines serving the Pacific Northwest.

The 37-mile long line serves as a feeder between Bonneville Power House and J. D. Ross Substation. One circuit of the line is tied directly to an aluminum plant in Troutdale.

This line — like so many of America's major transmission lines — is equipped with BTC Hi-Line Hardware. Specify BTC Drop Forged Clamps and Fittings for your own transmission line projects. You'll find they are easier to install — give efficient, trouble-free performance — and hold maintenance to a minimum.

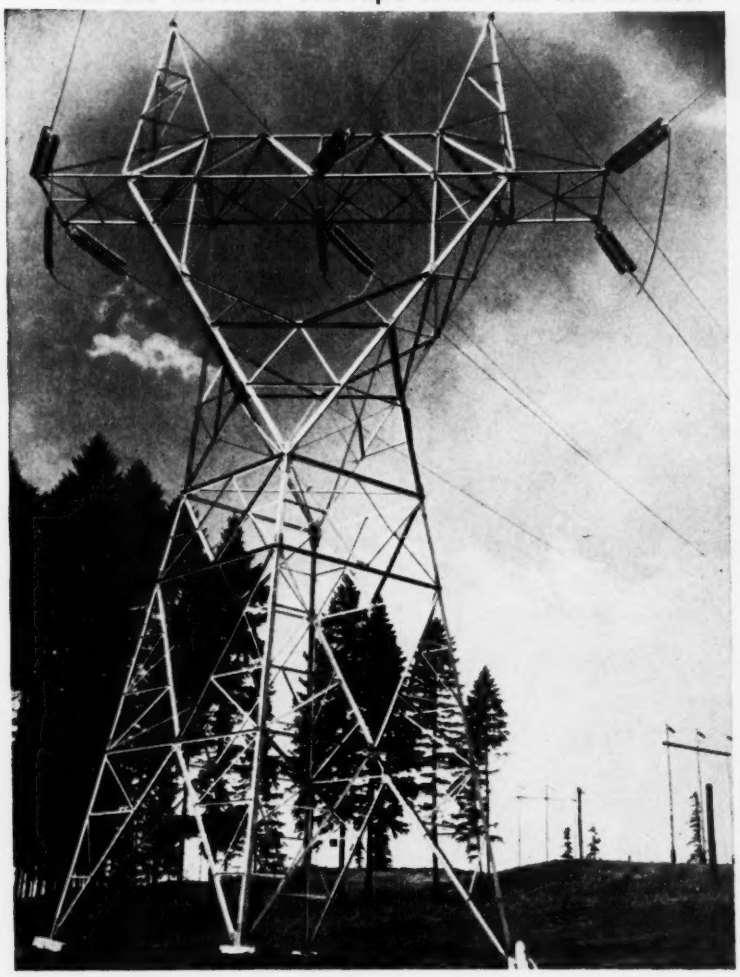


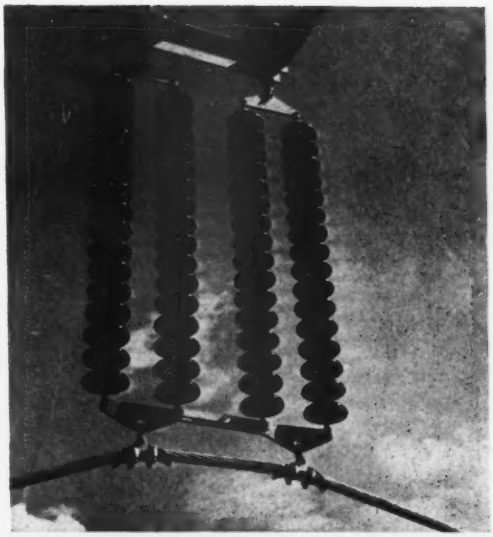
LONG WAY UP Bonneville Power Administration linemen install BTC Six-String Strain Yoke Sets on a Bradford Island Crossing Tower on the Columbia River. Note BTC Triple Strain Yoke Sets already in position.

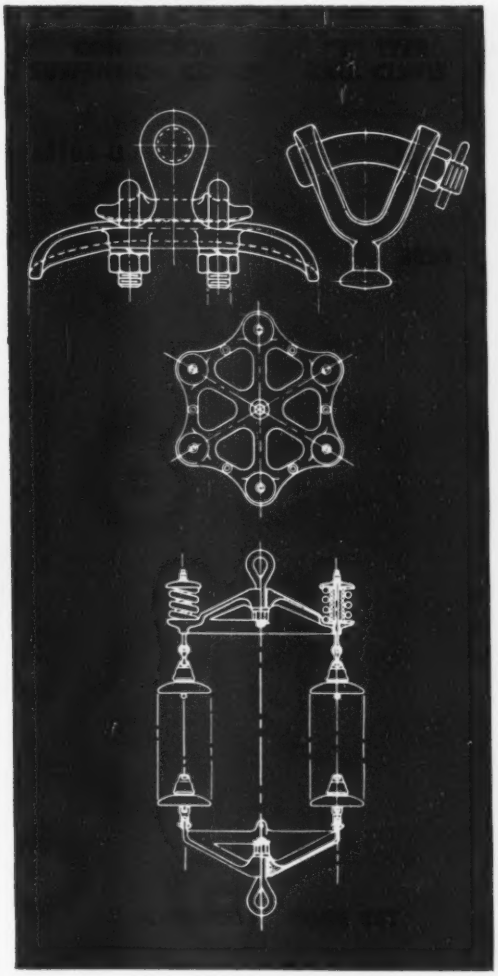
for the Pacific Northwest

BIRD'S EYE VIEW Two BTC Double Strain Yoke Sets with suspension clamps and stabilizer bar are installed on a Bradford Island Crossing Tower high above the Columbia River.

TYPICAL TOWER This single circuit angle dead-end tower is typical of those found along the 37-mile stretch between Bonneville and Vancouver. BTC Triple Strain Yoke Sets are used.





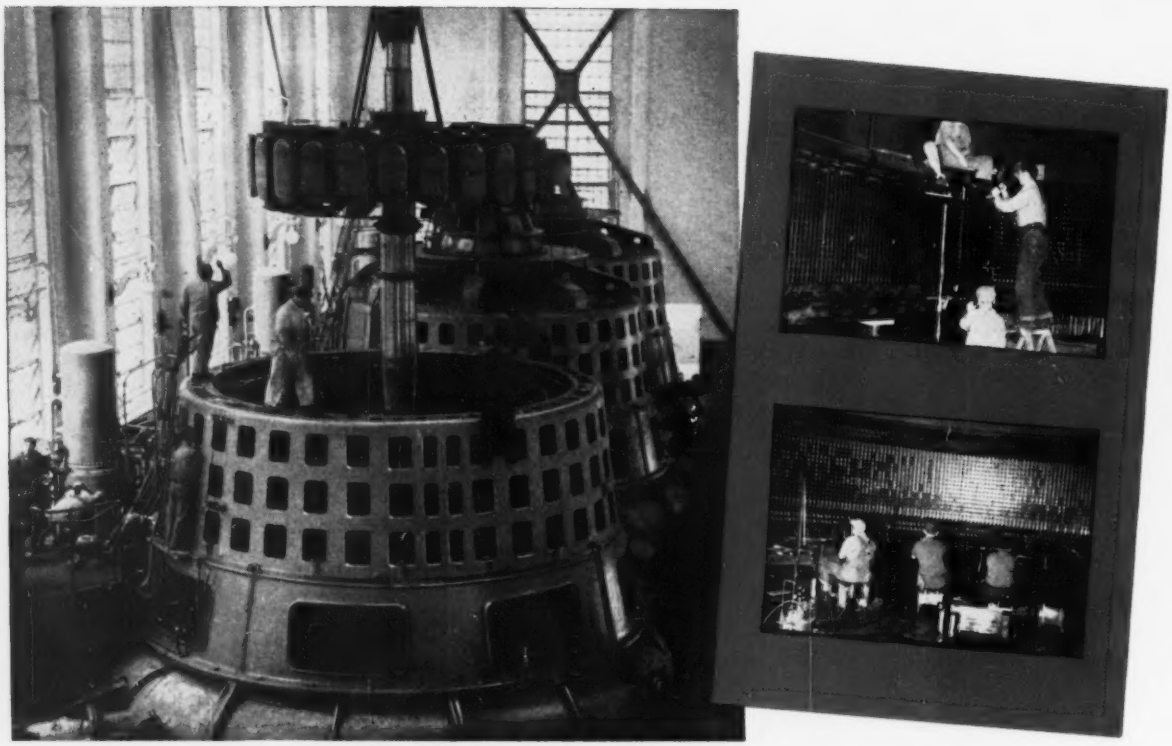


Sold Through Your Insulator Manufacturer Only

Drop Forged BTC Hi-Line Hardware

The **BREWER-TITCHENER** Corporation

Cortland · New York



generator windings with a *Longer* life span

Throughout the country, large generators are turning out more power as a result of National redesign work, National replacement windings and National rebuilding. In many cases, electrical characteristics have been changed to meet changed needs. In others, power output has been increased to meet increased demands. In still others, recurring trouble has been eliminated. In all cases, long life is assured. From the simplest replacement coil to the most complicated redesign job, National Electric Coil is dedicated not only to maintenance but also to *improvement*. When *any* piece of rotating electrical equipment presents a problem, communicate with National.

NATIONAL ELECTRIC COIL COMPANY

COLUMBUS 16, OHIO, U. S. A.

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

ROLLER SMITH
ELPECO

EQUIPMENT "Stands up" UNDER . . .

"TRIANGLE TESTING"

ROSELAND (N. J.) SWITCHING STATION OF PUBLIC SERVICE ELECTRIC & GAS COMPANY
220 KV
ROLLER-SMITH "ON THE LINE" TEST STATION
SIEGFRIED (PA.) SUBSTATION OF PENNSYLVANIA POWER & LIGHT COMPANY.
66 KV
220 KV
220 KV
PLYMOUTH MEETING (PA.) SUBSTATION OF PHILADELPHIA ELECTRIC COMPANY

When you purchase Roller-Smith and Elpeco equipment you are *assured* of perfect performance and extreme durability. Before any design is finally approved, both development models and production units are tested in accordance with applicable standards. Interrupting capacity and high current testing is done "in the field" under conditions of system stability exceeding those encountered under normal service conditions. The Roller-Smith Test Station, located directly adjacent to the Siegfried Substation, receives power at 66 KV from the 220 KV transmission system forming the Siegfried-Roseland-Plymouth Meeting "Triangle." Testing in this manner, rather than simulating the power conditions, insures your getting "more for your money" when you specify and buy—Roller-Smith and Elpeco.

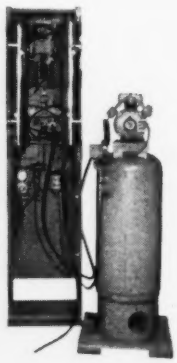
ROLLER SMITH

ROLLER-SMITH CORPORATION AND ELPECO DIVISION

BETHLEHEM, PENNSYLVANIA

ELPECO

"Check your air, Sir?"



Air compressor and tank are at right. Long cylinders on rack dry air before it enters cables.

He's checking the air pressure in a branch cable, one of scores serving a town. The readings along the cable are plotted as a graph to find low-pressure points which indicate a break in the protecting sheath.

Master meters keep watch over the various cable networks which leave a telephone office in all directions to serve a community. Air enters the system at 7 pounds pressure, but may drop to 2 pounds in outermost sections—still enough to keep dampness out.

To keep voices traveling strongly through telephone cables, you have to keep water *out*. This calls for speed in locating and repairing cable sheath leaks—a hard job where cable networks fork and branch to serve every neighborhood and street.

At Bell Telephone Laboratories, a team of mechanical and electrical engineers devised a way to fill a complex cable system with dry air under continuous pressure. Pressure readings at selected points detect cracks or holes, however small. Repairman can reach the spot before service is impaired.

It's another example of how Bell Laboratories works out ways to keep your telephone service reliable—and to keep down the cost to you.

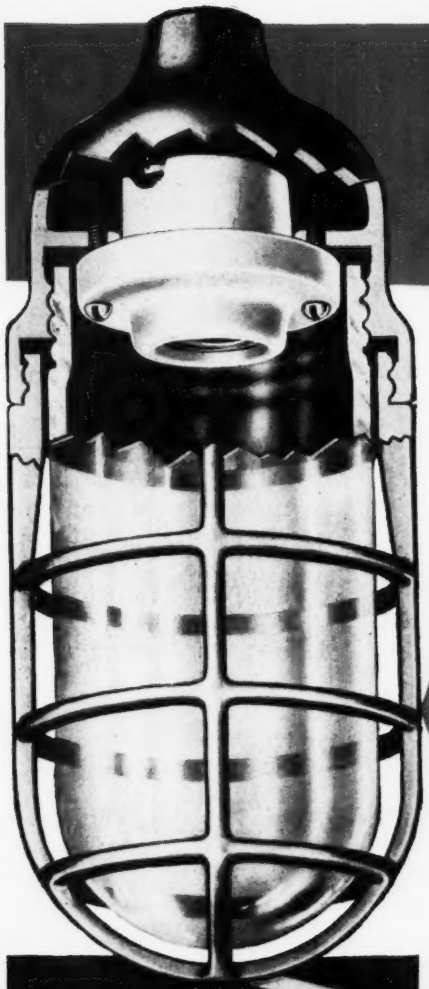
BELL TELEPHONE LABORATORIES

Improving telephone service for America provides careers for creative men in mechanical engineering

CROUSE-HINDS

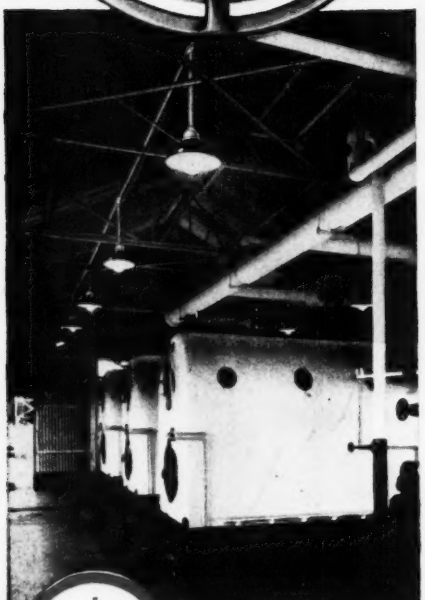
Vaportight

Industrial Lighting Fixtures



For use in boiler rooms, powerhouses, shower rooms, tunnels, loading docks, building entrances, and all indoor and outdoor locations where exposed to moisture and rain, non-explosive vapors and gases, or non-combustible dusts.

1. **Vaportight** and raintight.
2. **Wiring chamber** remains vaportight even though globe is off.
3. **Porcelain Receptacle.**
4. **Screw guard** or clamp guard.
5. **11 Hub** arrangements.
6. **4 Reflector** styles.
7. **Accessories:** Colored globes, pear-shaped globes and guards, half shades, and adapters.
8. **4 Sizes:** 50 through 500-Watt.



Vaportight lighting fixtures are available for attaching to several round-base Condulets and sheet steel outlet boxes. Crouse-Hinds complete *Vaportight* line includes hand lamps, switches, plug receptacles, and other electrical devices.

Complete listings in the Condulet Catalog.

A Nationwide Distribution Through Electrical Wholesalers

CONDULETS
FLOODLIGHTS
TRAFFIC SIGNALS
AIRPORT LIGHTING

CROUSE-HINDS COMPANY

Syracuse 1, N. Y.

OFFICES: Birmingham — Boston — Buffalo — Chicago — Cincinnati — Cleveland — Dallas — Denver — Detroit — Houston Indianapolis — Kansas City — Los Angles — Milwaukee — Minneapolis — New Orleans — New York — Philadelphia Pittsburgh — Portland, Ore. — San Francisco — Seattle — St. Louis — Tulsa — Washington.
RESIDENT REPRESENTATIVES: Albany — Atlanta — Baltimore — Charlotte — Corpus Christi — Richmond, Va. Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

Where You Find "Buffalo" Fans You Find Dependable Draft

The many leading firms throughout the world which rely on "Buffalo" Forced Draft, Induced Draft, Primary Air and other mechanical draft fans are testimony to their dependability. And there are no two ways about it — the fan you can depend on is the cheapest fan in the long run. Fewer draft timeouts, shorter draft timeouts and longer fan life are the ways in which "Buffalo" Draft Fans are cutting power production costs. Heavy overall construction — reinforcement in the right places — accessibility — are the long-life characteristics of "Buffalo" Fans. Why not write for BULLETIN 3750 for your files—and investigate these dependable fans?

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

212 MORTIMER ST. BUFFALO, NEW YORK

PUBLISHERS OF "FAN ENGINEERING" HANDBOOK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont. Sales Representatives in all Principal Cities

DIAMOND JUBILEE 75TH ANNIVERSARY

VENTILATING | PRESSURE BLOWING | AIR CLEANING | COOLING | AIR TEMPERING | HEATING | INDUCED DRAFT | FORCED DRAFT | EXHAUSTING

APPROVED

SAFETY CANS

For general use wherever flammables are employed at any point within the plant. Have electrically seamwelded, sturdy bodies reinforced by beading. Fire baffle is a double concentric cylinder inside the base of the spout. Spring-loaded cap is mounted on a ball and socket joint to automatically make a tight, complete closure. Squeeze-grip handle is wide, oval, roomy. Ease and positive control while pouring.

For more than a quarter-century The Protectoseal Company has devoted its entire research and engineering organization and its modern manufacturing facilities exclusively to the production of a complete line of containers and devices for the safe control and handling of flammable liquids.

These years have seen an enormous increase in the use of flammables by industries of widely different types and natures, and today there is hardly a shop or plant or process which does not make every-day use of flammables at some point, if only when cleaning and finishing.

It is extremely important, therefore, not only that life and property should be thoroughly safeguarded against the dangers inherent in these flammables, but that there should also be no interference with or slowing down of production; and it is Protectoseal's insistence upon "Protection with Production" that has made Protectoseal products preeminent in industry.

A COMPLETE LINE OF PLANT SAFEGUARDS

There is a Protectoseal product for the safe handling of flammables at every point from receiving and storage through use in maintenance and operation. To assist you in safeguarding your properties completely, a series of Self-Checking Charts have been prepared and are available without cost as a safety service to industry.

APPROVED

OILY WASTE CANS

A necessity in every shop or plant for the safe placement of oily or solvent-soaked rags, cleaning swabs and other waste shop material; required by many insurance companies. Permanently closed can is of sturdy seam-welded construction. Full length cover hinge for permanent alignment. Opens wide by slight foot pressure at any point on full-width treadle for easy use.

Approved by Underwriter's Laboratories, Inc., and Associated Factory Mutual Fire Insurance Companies

THE PROTECTOSEAL COMPANY

1920 S. Western Avenue, Chicago 8, Illinois • In Canada: Safety Supply Co., Toronto

The Protectoseal Company
1920 S. Western Avenue, Chicago 8, Illinois

Please send the informative literature checked below:

____General Plant and Laboratory Container Catalog
____Catalog of Vents and Fittings for Bulk Storage
____Self-Checking Charts

Name_____

Title_____

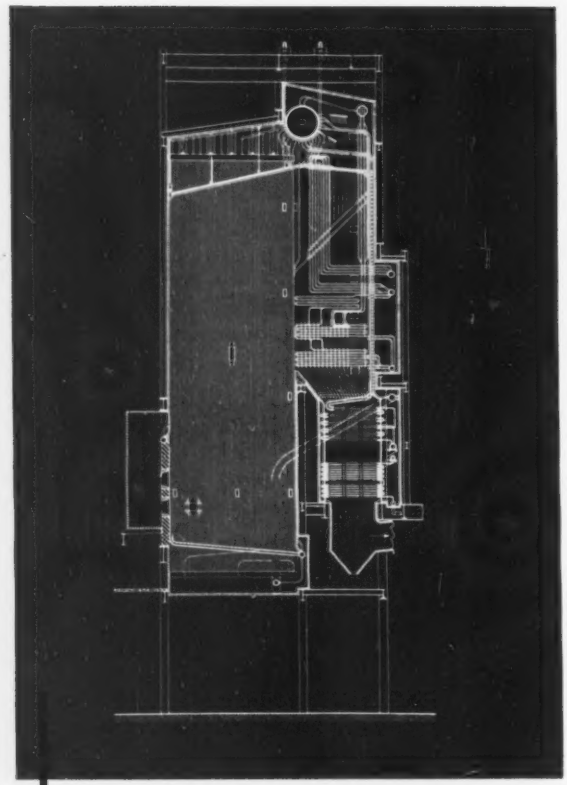
Company_____

Address_____

City_____ Zone____ State_____

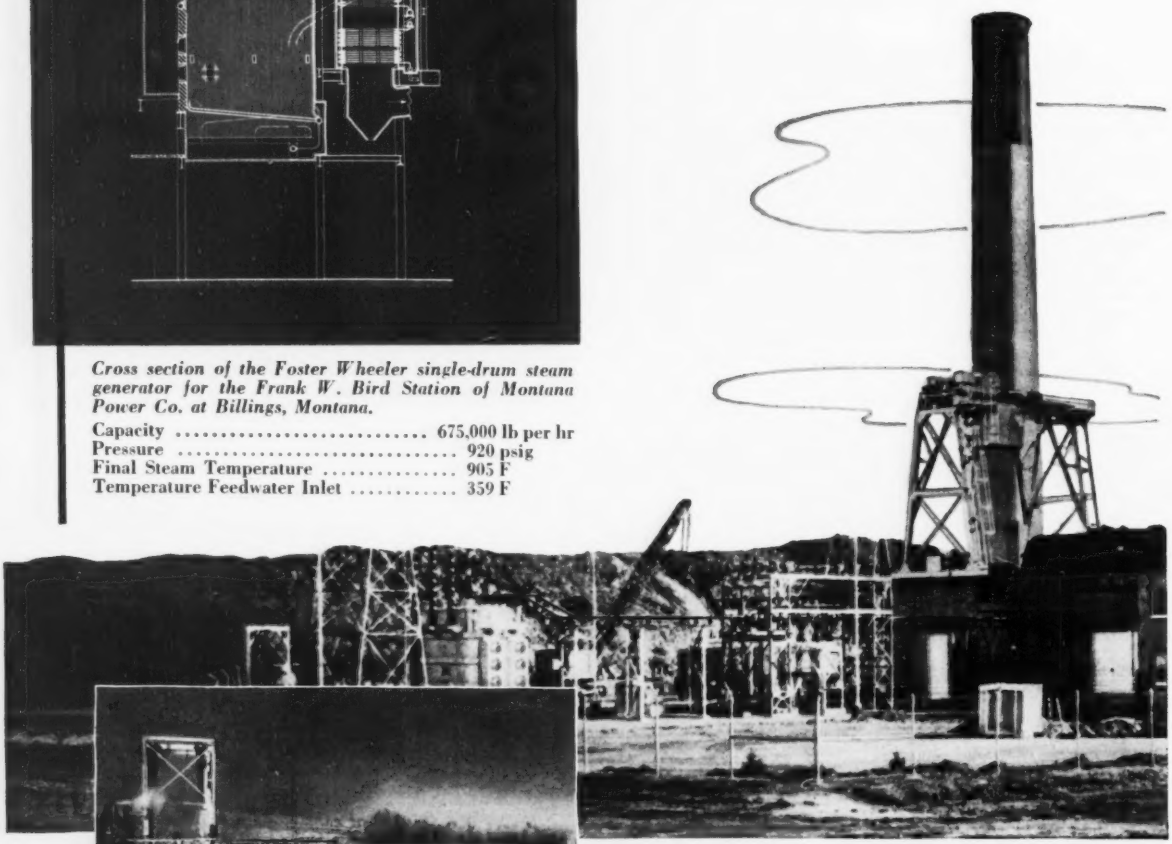
"Operation SUB-ZERO" Proves

Bird Steam Plant shows 11,400 Btu per kwh station output for all purposes



Cross section of the Foster Wheeler single-drum steam generator for the Frank W. Bird Station of Montana Power Co. at Billings, Montana.

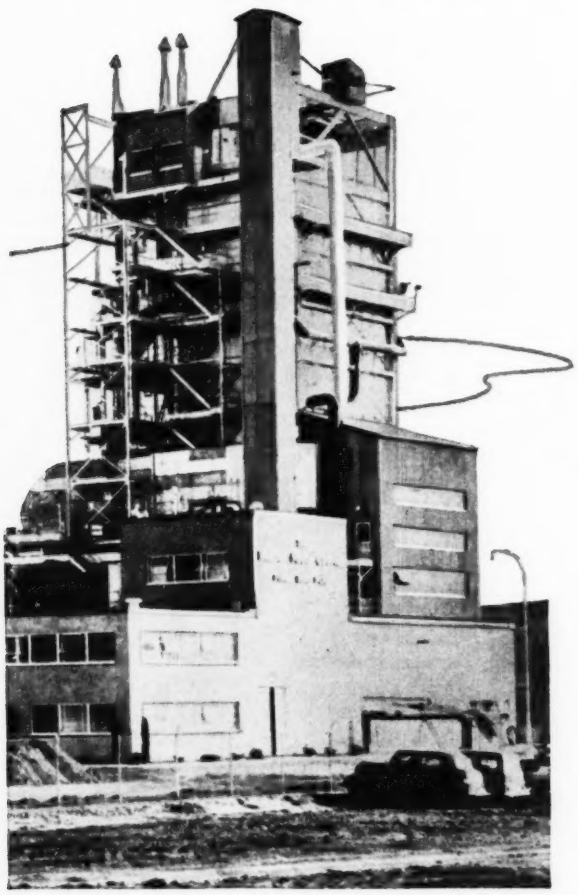
Capacity	675,000 lb per hr
Pressure	920 psig
Final Steam Temperature	905 F
Temperature Feedwater Inlet	359 F



Circulating water intake showing severe conditions of winter operation.

Efficient and Economical

Under the severe operating conditions of temperatures as low as —40F at an elevation of 3100 feet, this semi-outdoor plant of the Montana Power Company engineered by Ebasco Services Inc., has proved efficient and economical in operation and construction. Here are the facts:



HIGH STATION EFFICIENCY

During October 1952, with a metered daily average kwh output of 65,917, the fuel burned for a day consisted of 1,464 bbl of oil, plus 7,630,536 cu ft of natural gas. The oil provided 6,400,000 Btu per bbl, the gas 1,140 Btu per cu ft. Total Btu for all purposes per kwh station output was 11,400.

OPERATED ABOVE RATED CAPACITY

Although normal load condition did not require regular operation above 600,000 lb steam per hour and 60 megawatts, load was picked up to 705,000 lb steam per hour and 76 megawatts in fifteen minutes and carried for two hours.

MINIMUM PERSONNEL

Efficiently operated by only 4 men on each 8-hour shift.

CONSTRUCTED COST

Complete cost, on the basis of 66,000 kw, was approximately $87 per kw.

Once again, the operating facts of an installation indicate the ability of Foster Wheeler to design and fabricate power-producing equipment to meet your needs.

FOSTER WHEELER CORPORATION
165 BROADWAY, NEW YORK 6, N. Y.

FOSTER WHEELER

NEW HORSEPOWER!
NEW BRAKING POWER!
NEW EARNING POWER!

Biggest truck values of the year! New, just-announced Dodge trucks with features like . . .

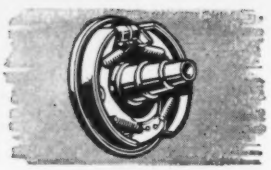
7 high-compression engines, with 100 to 171 horsepower, give you more ton-miles per hour, more deliveries per day! New styling inside and out, tough new floors in pick-up and panel bodies, new tighter-than-ever tailgates on pick-ups and expresses! A total of more than 50 brand-new features to boost truck earning power!

More, you get such famous Dodge extra values as lightweight aluminum-alloy pistons, rivetless Cyclebond brake linings on all hydraulic brakes, moistureproof ignition, shot-peened rear axle shafts! Get more truck for your money . . . see your neighborly Dodge dealer!

NEW!

MORE POWERFUL ENGINES!

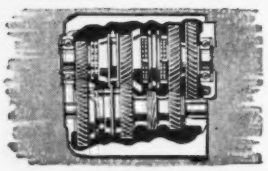
7 high-horsepower engines! 3 brand-new, with increased displacement, greater cooling capacity, twin carburetion available on larger trucks!



NEW!

BETTER BRAKING!

Super-safe brakes stop smoothly, easily, with less pedal pressure! New increased stopping ability on 1- thru 2½-ton trucks!



NEW!

NO GEAR-SHIFTING!

Truck-o-matic transmission with gyrol Fluid Drive available on ½- and ¾-ton models! Saves shifting, yet lets you rock out of snow, mud!

NEW!

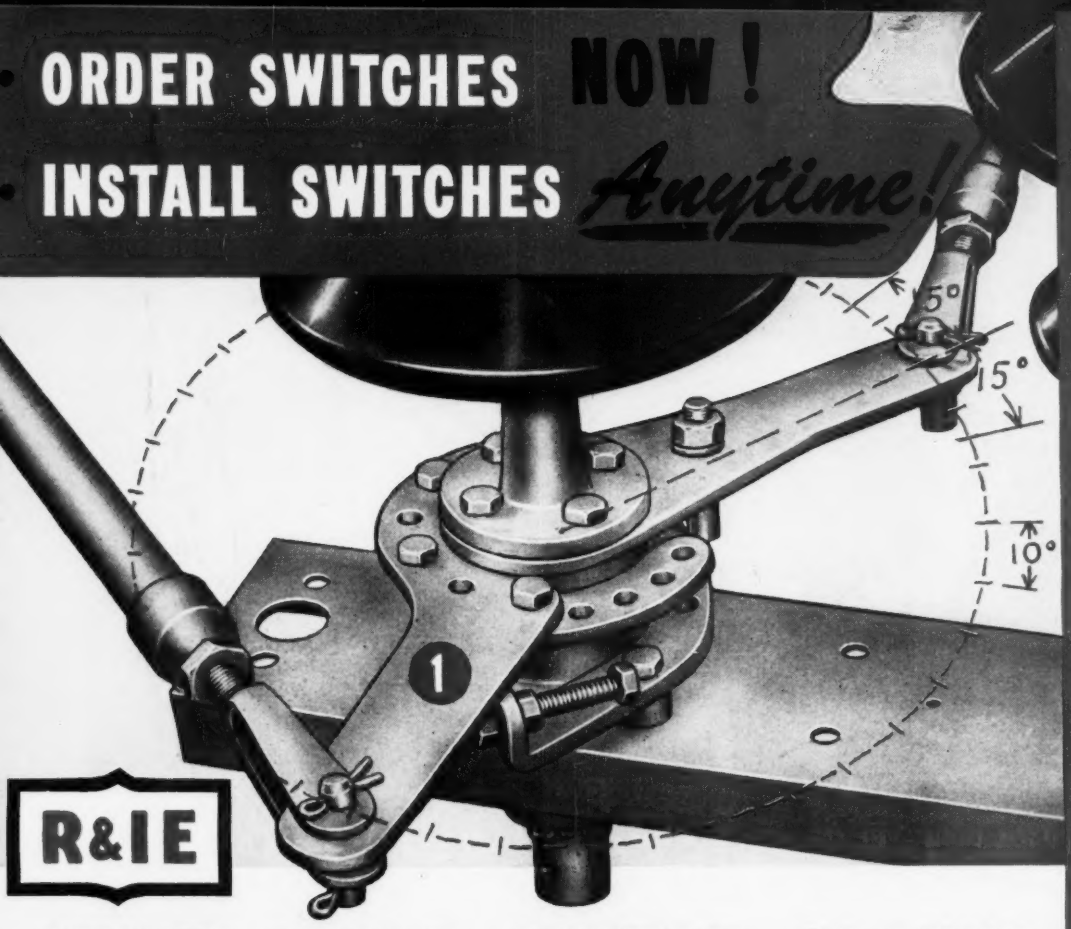
OVER 50 FEATURES!

Reinforced cab construction, larger exhaust system, new 116″ wheelbase ½-ton pick-up! Dodge-Tint glass, higher output heaters available!

There's one to fit your job . . . ½-ton through 4-ton. See your friendly Dodge dealer.

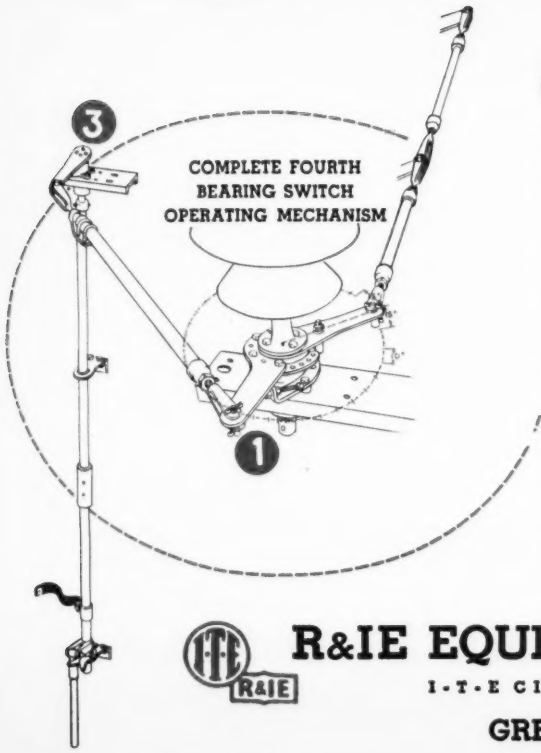
DODGE "Job-Rated" TRUCKS

ORDER SWITCHES NOW!
INSTALL SWITCHES *Anytime!*



R&IE

MULTI-ANGLE SWITCH CRANKS
Save Engineering and Installation Time!



CHECK THE FACTS

1. **UNIVERSALLY ADJUSTABLE**–Permits Angular crank adjustment to within 5 DEGREES of desired operating location.

2. **NO WAITING FOR FINAL STRUCTURAL DETAILS** to order switches. Adjustable features of crank permit switches to be installed at any time on any type structure.

3. **RANGE OF POSITION** — Unlimited. Fourth Bearing can be placed in any desired position on the structure.

4. **MORE DETAIL** found in Bulletin 1405B. Send for your copy.

R&IE EQUIPMENT DIVISION

I-T-E CIRCUIT BREAKER CO.

GREENSBURG, PA.

The Check List

CONDUCTOR SUPPORTS, CLAMPS AND FITTINGS

DISCONNECTING SWITCHES INDOOR AND OUTDOOR

HORN GAP SWITCHES

INTERRUPTER SWITCHES

CUTOUTS AND THERMO-RUPTERS

DISTRIBUTION EQUIPMENT

SWITCH OPERATING MECHANISMS

SUBSTATIONS

OPEN OR ENCLOSED ISOLATED PHASE HEAVY DUTY BUSES

KIRK INTERLOCK SYSTEMS

AUTOMATIC SWITCHING EQUIPMENT

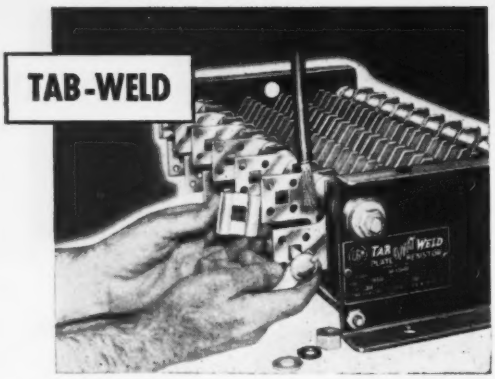
METAL CUBICLES

TESTING DEVICES

NOW...

A COMPLETE LINE OF
WELDED RESISTOR SECTIONS

up to 150 amperes continuous capacity without internal paralleling



SPECIFY EC&M BULLETIN 942
EC&M TAB-WELD RESISTORS

No Crowding . . . 3/8" to 3/4" spacing between grids in EC&M Types TW and TW-X Sections

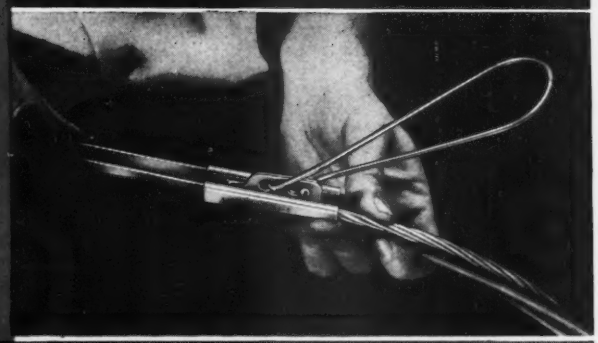
In both styles of EC&M Welded Plate Resistor Sections, heat radiation is *efficient*. Spacing between grids is a minimum of 3/8" on the smallest grid size up to a 3/4" maximum on the 150-ampere continuous capacity section.

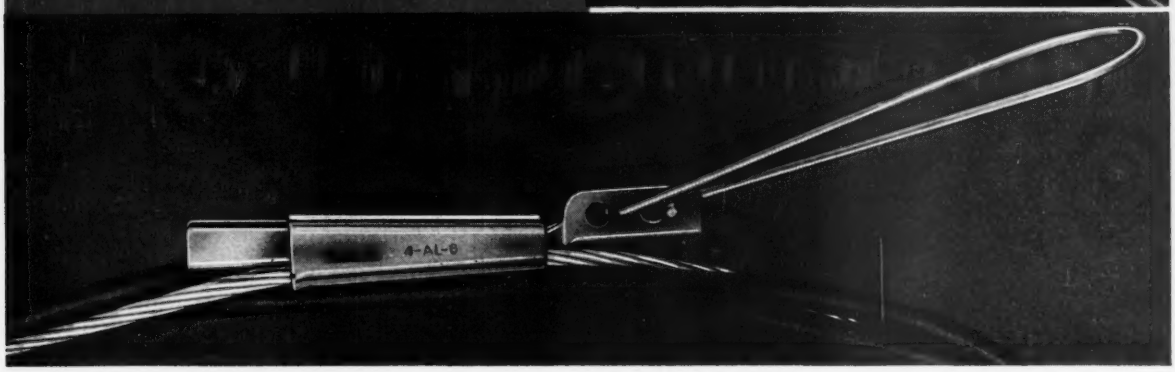
Likewise efficiently designed are the individual grids, resulting in completely covering a plant's requirements with a *minimum* of sizes.

Remember, also, these EC&M TAB-WELD Resistors may be used "off-the-storeroom shelf." Many taps make on-the-job connections easy and readily permit small adjustments in resistance-value.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

NEW Reliable ALUMINUM SERVICE WEDGE CLAMP Offers INSTALLATION ECONOMIES





THIS WEDGE CLAMP CAN BE APPLIED TO BARE NEUTRAL ANYWHERE IN THE RUN

Aluminum service cable can now be put up and sagged before the cable is cut with the new Reliable 7080 service wedge clamp. The cable can then be cut to exact length with no waste. You don't have to feed an end of the cable through the clamp. This new clamp permits easy attachment to bare neutral of twisted service drop cable at any point in the span.

Simply slip the aluminum shell around the bare neutral and insert stainless steel wedge along steel rails. It grips securely, tightens automatically under load and does not depend upon screw clamps. Load is generously distributed over long surfaces of shell and wedge to avoid damage to conductor. The stainless steel bail can be used with hooks, spools or knobs. One leg is removable for ease of installation.

This clamp is equally suitable for open wire aluminum services, and it will accommodate all #6 and #4 sizes and #2 solid.

Write for more detailed information, or ask for a practical demonstration.

Reliable **ELECTRIC COMPANY**

3145 CARROLL AVENUE
CHICAGO 12, ILLINOIS

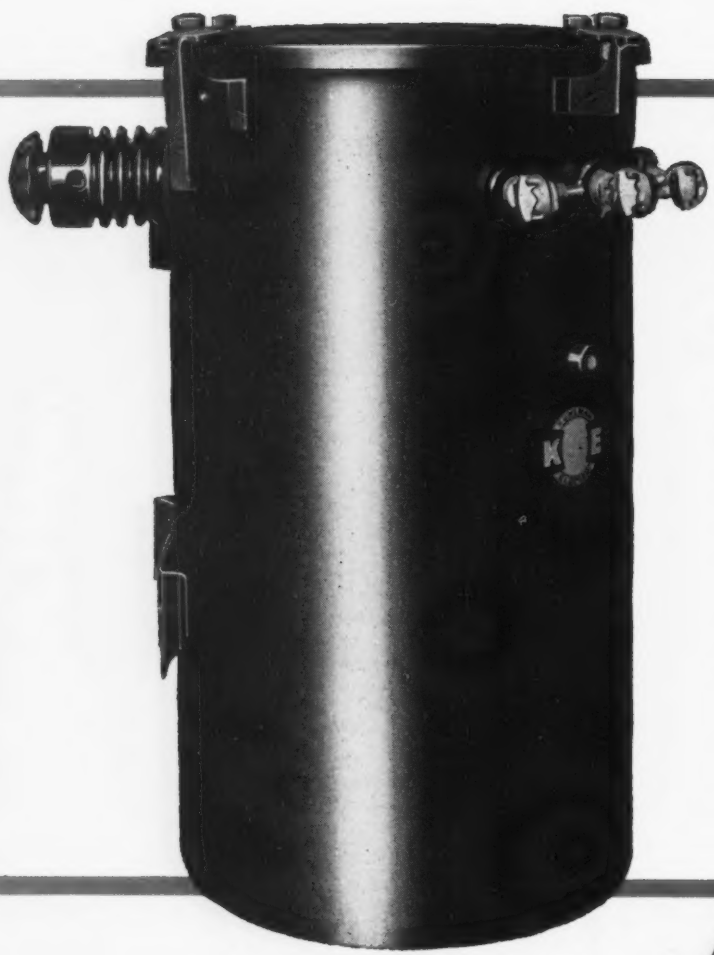
OVER 45 YEARS OF SERVICE TO THE UTILITIES

POWER-LINE CONNECTORS and CONSTRUCTION SPECIALTIES

Kuhlman

NEMA standards

leadership in the



For many years electrical engineers believed that practically everything had been done to improve the quality of transformers. But in 1929 the Kuhlman Electric Company applied for a patent on a revolutionary new type of core. This was to be a core that decreased exciting current by reducing the number of air gaps between laminations.

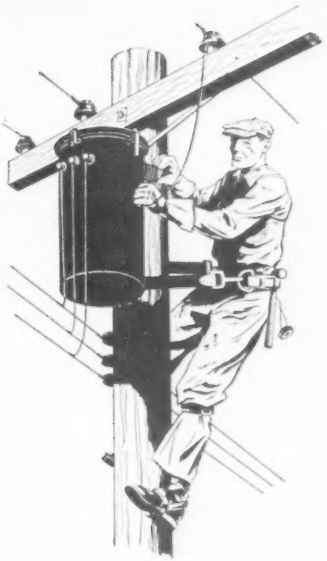
In 1935, Kuhlman began manufacturing transformers with this new type core — known as the Bent Iron Core. A couple of years later cold rolled, oriented silicon steel was introduced to the industry. The Bent Iron Core was ideally suited for full utilization of the improved magnetic qualities of oriented grain steel.

Other transformer manufacturers were quick to realize these advantages. And so today nearly every manufacturer produces cores based on the principle of the Bent Iron Core.

Again in 1938 Kuhlman came out with another "first" — the "Quick-Grip" bushing. Here was a bushing that made the connection of high voltage terminals as easy as plugging in a home appliance! All

Kuhlman

gives you plus . . .



design and improvement of transformers

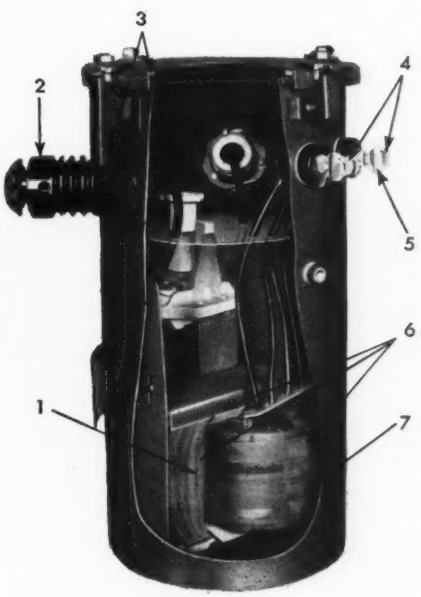
the lineman has to do is insert the wire and tighten the knob. All by hand. No tools needed.

Today, the demand for this bushing is so universal that nearly every manufacturer now includes it in distribution transformers.

These are just two of the "firsts" of the Kuhlman Electric Company. Others include oil impregnation of transformer coils, silicone insulation, and the forerunner of the modern series street lighting transformer.

Kuhlman has been building transformers since 1894, so it can truly be said that Kuhlman and transformers grew up together. And Kuhlman continues to search for better materials, methods, and designs so that you can have better transformers. That's what we mean when we say "Kuhlman gives you NEMA Standards plus . . ."

So specify Kuhlman when buying transformers. Talk to the Kuhlman representative in your area or write direct to Bay City, Michigan for details. For more information about distribution transformers, ask for Bulletins CS-201 and CS-202.



Here are the outstanding features of Kuhlman Conventional Distribution Transformers—100 KVA and below

1. Bent Iron Core — a smaller, lighter, more efficient unit!
2. "Quick-Grip" knob type bushings.
3. Corprene sealing gaskets on cover and bushings. Bushing shanks are brought well into the tank, or are extended below the oil level, eliminating chance for internal flashover.
4. Stud type low voltage bushings with solderless connectors.
5. Pressed terminal lugs.
6. Easily removable core and coil units. When transformer is in use, bolts hold units securely in place.
7. Completely protected coils — by drying and by coating with high grade phenolic base polymerizing type varnish which bonds coil into compact structure.

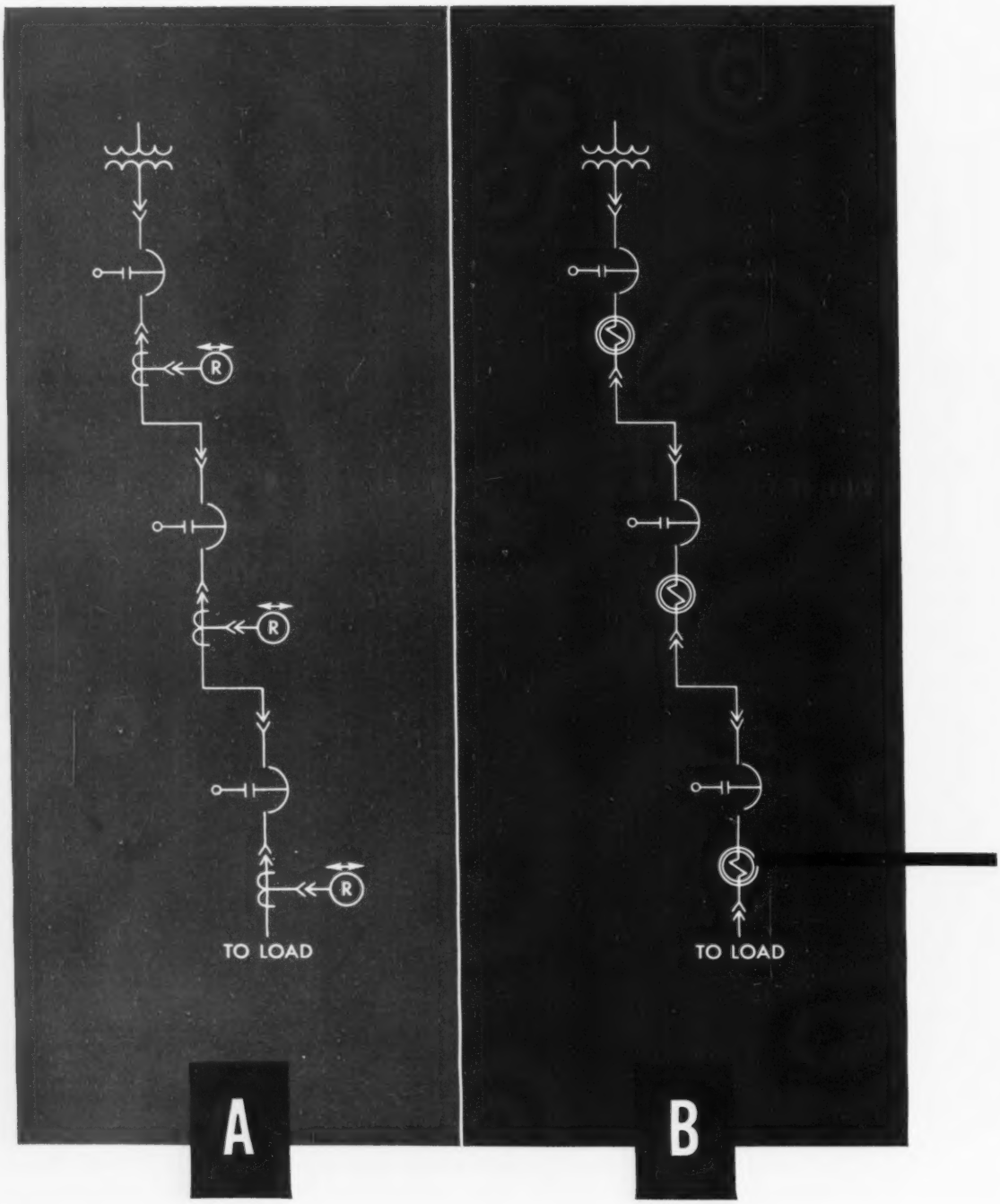
134

ELECTRIC COMPANY
BAY CITY, MICHIGAN • CRYSTAL SPRINGS, MISSISSIPPI

EXPORT REPRESENTATIVES: *International Standard Electric Corporation,*
15th Floor, 50 Church Street, New York 7, New York
Cable address: Microphone, New York

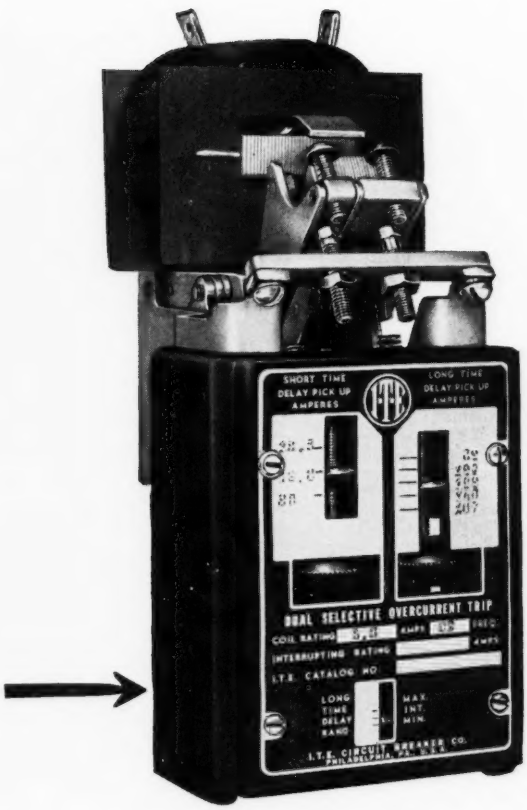
KUHLMAN K E ELECTRIC

Both systems provide



selective trip circuit breaker protection

but this *direct-acting* device on I-T-E circuit breakers cuts initial cost and saves space



These two systems were designed to perform identical functions. System **(A)** is costlier, takes more space, and requires a greater degree of skill to maintain.

System **(B)** represents the latest thinking in low-voltage system reliability and introduces the use of I-T-E circuit breakers with direct-acting dual-selective overcurrent trip devices. Savings in initial investment, in space, and in over-all maintenance are achieved.

Recent installations in central stations, processing industries, and manufacturing plants have proved that I-T-E circuit breakers with direct-acting selective overcurrent trips should be carefully considered for every new installation.

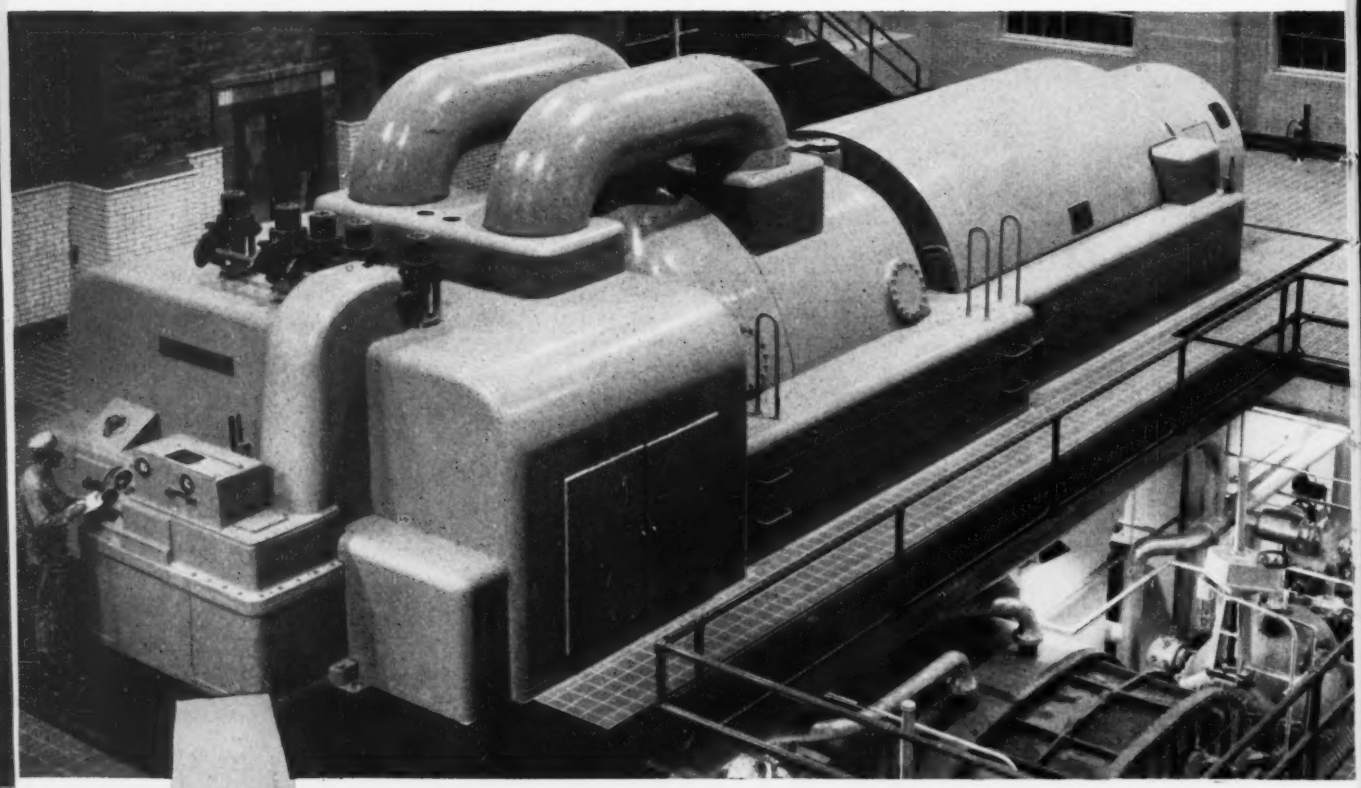
I-T-E

LOW-VOLTAGE SWITCHGEAR

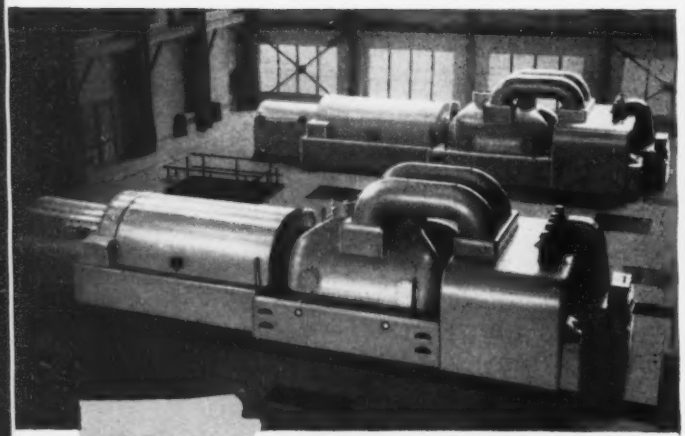
I-T-E CIRCUIT BREAKER COMPANY • 19th & Hamilton Sts. • Philadelphia 30, Pa.

EPD—CANADIAN MFG. & SALES: EASTERN POWER DEVICES, LTD., TORONTO

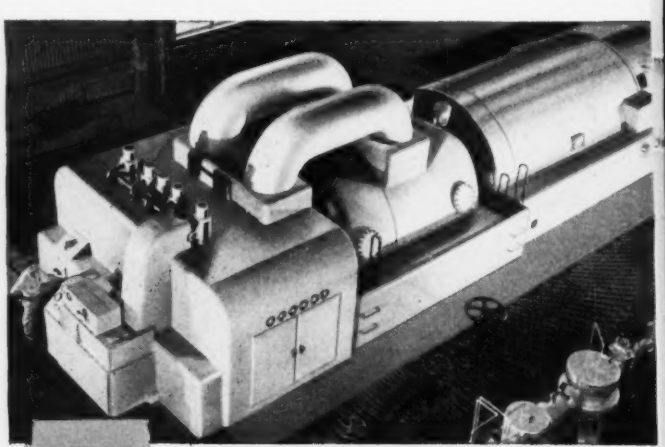
POWER for the



ALABAMA area has experienced an industrial power consumption rise of over 12½% in one year's time. To help meet this rocketing power demand, the Alabama Power Company just recently installed this Allis-Chalmers 40,000 kw steam turbine hydrogen cooled generating unit at its Chickasaw station in Mobile. A-C also supplied the 30,000 sq ft surface condenser and its auxiliaries, including two 25,000 gpm circulating pumps and motors.



ARKANSAS has the largest U. S. deposit of bauxite ore, primary to the production of aluminum. These two Allis-Chalmers 40,000 kw condensing, tandem compound steam turbine hydrogen cooled generating units form the Lake Catherine steam-electric station of the Arkansas Power & Light Company. Most of this power is used to electrolytically reduce alumina.



LOUISIANA industry and agriculture are mushrooming. The Gulf States Utilities Company — serving an area from Baton Rouge to across the Brazos River in Texas—has doubled its customers and tripled its power generation in the last decade. A-C recently supplied 75,000 kw in generating capacity to Riverside station near port city of Lake Charles. Unit shown is 40,000 kw.

Booming South!

NEW ALLIS-CHALMERS TURBINE-GENERATORS HELP SUPPLY MUSHROOMING INDUSTRIAL DEMAND

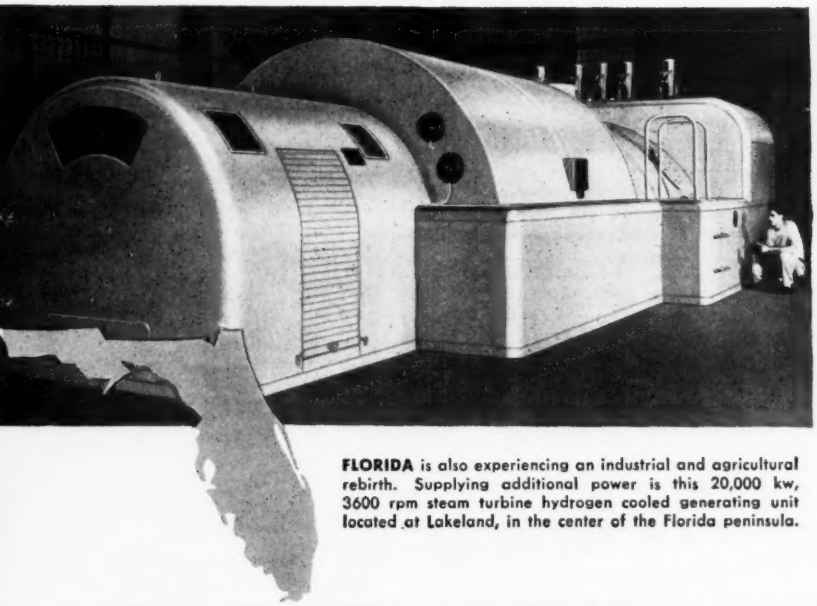
YOU'VE HEARD OF the South's mushrooming industrial growth. Here are some of the Allis-Chalmers steam turbine generator units newly installed to help satisfy that insistent power demand.

All these modern units conform to AIEE-ASME preferred standards in addition to incorporating many exclusive Allis-Chalmers main design features. The hydrogen cooled generators all have the A-C originated "walk-in" exciter housings. And these 3600 rpm turbines all have the following outstanding features:

Hydraulic control and operation with accessible placement of main stop valve; centralized grouping of operating controls; cam-operated inlet valves accessibly located on top of cylinder; and exclusive A-C method of temperature compensation for horizontal *and* vertical thermal movement.

All oil piping is above the floor, simplifying foundation and installation. And, as throughout the complete Allis-Chalmers line—ranging from the smallest single cylinder machines to single shaft, tandem compound, condensing units of 150,000 kw — labyrinth steam seals are used. The steam sealed gland system is self-contained and provides dependability with minimum attention.

You get the real design advances *first* from Allis-Chalmers. When planning the installation or expansion of your steam-electric power plant, let A-C simplify your problem. This *one* source will provide you with the world's widest range of power plant equipment. For your copies of literature on all products mentioned, call your nearest A-C office or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A-3842



FLORIDA is also experiencing an industrial and agricultural rebirth. Supplying additional power is this 20,000 kw, 3600 rpm steam turbine hydrogen cooled generating unit located at Lakeland, in the center of the Florida peninsula.

ALLIS-CHALMERS *firsts*

Simplified hydrogen seal and control

World's lowest exhaust pressure steam turbines

Solidly-bolted-down steam end pedestal

Turbine for one-boiler-per-turbine arrangement

"Walk-in" exciter housing

30,000 kw, 825 F turbine, in 1931

825 F reheat turbine, in 1935

AND NOW...First with supercharged hydrogen cooling!

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

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All voltages up to 5000 volts.

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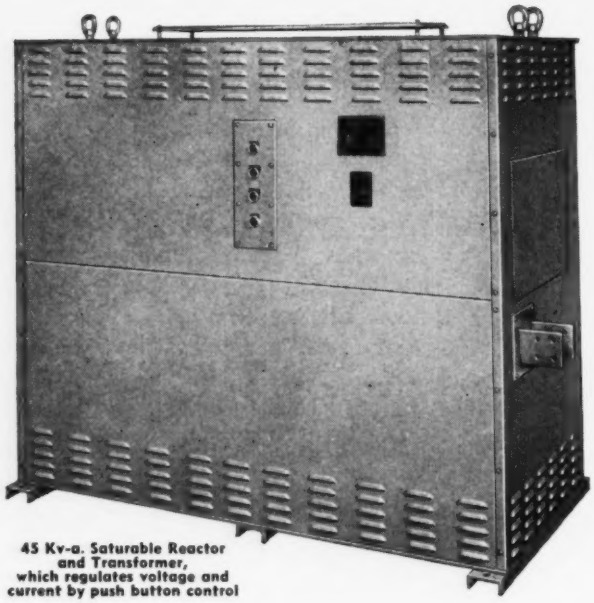
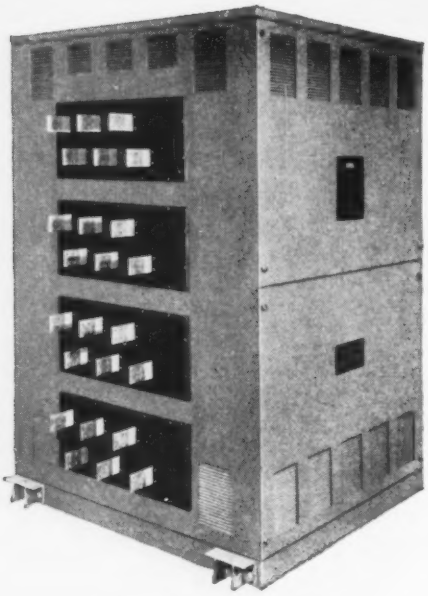


45 Kv-a. Saturable Reactor and Transformer, which regulates voltage and current by push button control



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All voltages up to 15 KV.

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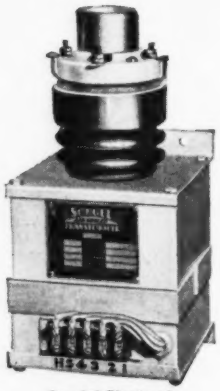

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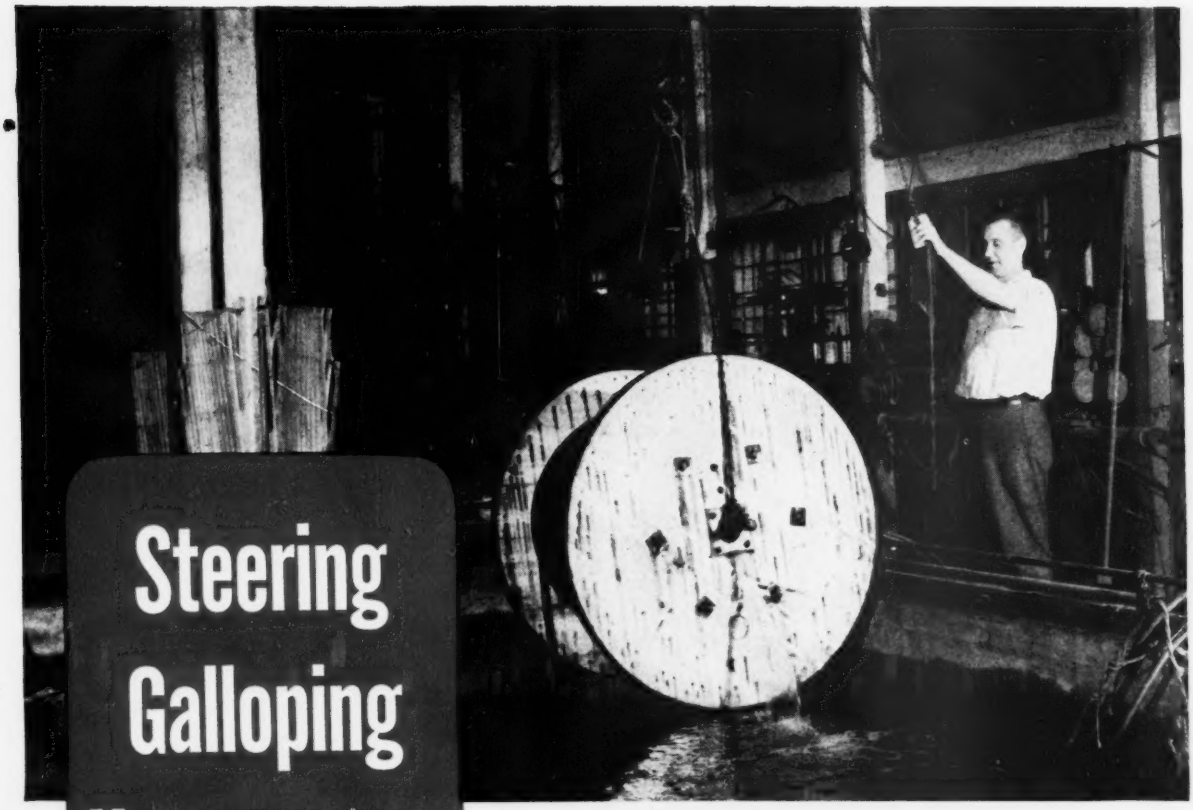

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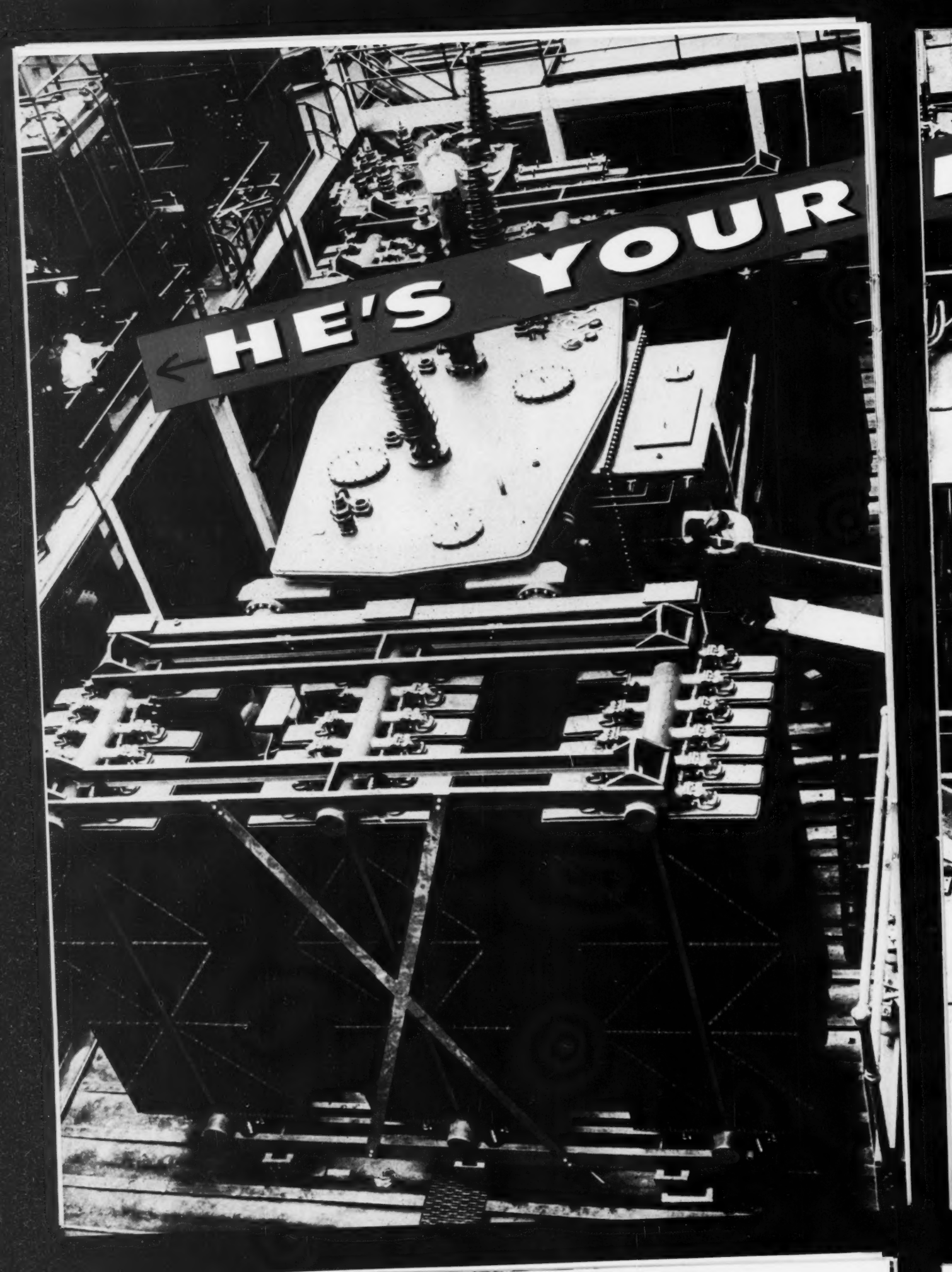
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MAN !

Who is he?
Perhaps he works for the electrical utilities
. . . concerns himself with the generation,
transmission or distribution of electric power.
Possibly he works for big industry, which generates and distributes
much of the power it consumes.
He could work for one of the many electrical manufacturers who design
and build the specialized equipment used in the electric power field,
and then again, he could be a consulting electrical engineer.

But one thing is certain, regardless of who he is.
He, and thousands more like him,
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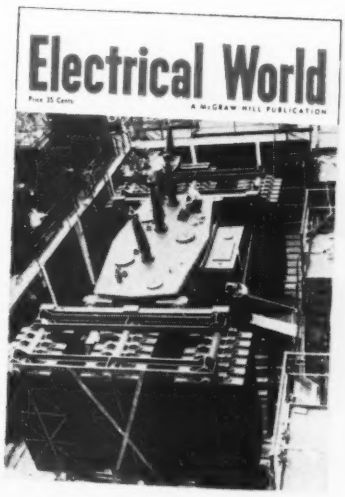

Electrical World

Where the electric power industry gets the most information . . . and gets it first!

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"If the Mountain Will Not Come to Mahomet, Mahomet Must Go to the Mountain"

It is always a privilege and a pleasure to conduct people through our plant. Most of those who make this tour for the first time express amazement at the scope of our facilities. They see a factory with facilities and techniques that are unexcelled anywhere in the industry. So, for those of you who cannot come to see us in person, we have prepared a booklet which literally is a pictorial trip through our plant . . . 48 pages in full color, showing our complete facilities. It's yours for the asking . . . just drop us a line on your company letterhead requesting Bulletin GF 531, "A Trip Through the Moloney Plant."

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Ready for the Next Storm?

Disruptive storms often strike without more than a few hours warning, and the worst ones leave wreckage behind them. If householders are granted time enough, they can batten down and hope for the best. Wire-using utilities have to do most of their "battening down" far in advance, in fact largely when the lines are designed and built. One just builds them as strong as previous adverse weather dictates. After that "hoping for the best" simmers down to preparations for restoring the storm damage as quickly as possible.

But no matter how promptly the services are restored in the face of dire difficulties, there is a growing tendency for municipal authorities to make public issue of extended outage. They are not necessarily reaching for political capital. In this day they can honestly reflect a public attitude that electric service has become so indispensable that excuses, no matter how valid, are no alibi for chilly rooms, mealless kitchens, and spoiled frozen foods.

In no sense does this mean that the authorities are right in urging that it is logical and economic to move all wires underground. There are few users anywhere who would stand for the increase in rates that such drastic escape from storm damage would surely entail. Underground has always been several times as costly as overhead, and the ratio of costs has been increasing.

Reasons for the difference in cost are hard to explain to the public. Fortunately it is not necessary to explain them. The essential task is to be in a position when the agitation arises to demonstrate (1) that there are intermediate measures, (2) that the utility has a well-defined program to apply progressively the most feasible of these measures, and (3) that the public has certain responsibilities of its own in the matter and must live up to them.

In between full underground and conventional pole-lines are several types of construction each affording its own intermediate values of performance and cost-to-build. There are aerial cables, buried cables, semi-underground, alley locations for wires and for transformers. Each has its own peculiar degree of isolation, protection, shielding, and its own esthetic contribution. The public knows next to nothing about these transition measures, how much they add to reliability, to cost control, and to minimization of traffic interference. Nor can the non-engineering public be expected to know them unless they are told.

Better to tell the practicability of these part-way measures than to argue that whole-hog underground is too costly for even the consumer to bear. Better to recognize that what the public reasonably wants is prompt restoration of service and not, unreasonably, service that never for a moment is interrupted. Best of all tell the public candidly two things: First, line construction will be made less vulnerable as fast as that can be done economically. Second, intensive preparations have been made to reduce outage time to a tolerable minimum after the next storm.

Tomic Energy

It is odd how we engineers get off on the wrong foot in our technical terminology and then freeze in that stance. Electric currents are stated to flow from plus to minus around the circuit but actually it is the electrons swarming the opposite way. Similarly the north poles of magnets are either south poles "seeking" the north pole of the earth or else the north pole is strictly a south pole attracting the true north poles of our magnets.

In that environment it might be worthwhile to look at our terminology in connection with atom splitting. We call the result atomic energy. But is it? The Greek philosophers sought the ultimate non-splittable particle of matter. When you achieved that degree of fineness you could subdivide no further. In Greek a = not and tom = splittable so it was logical to dub the particle the a-tom. Now we moderns know better and know that the energy derivable from the atom comes from its splittability. Tomic energy is therefore a more rigorous designation for the energy that originates in splittability. Those who don't like the switch can escape by resort to "nuclear."

Rights-of-Way Can Be An Asset

The season is at hand when many utilities map programs for clearing brush from rights of way. They must again decide whether to cut, bulldoze, or spray. If they spray, which technique best meets requirements, and how should it be applied? Arguments for one or another have embellished the agenda of many meetings. Success has been claimed for each method by its adherents. But over all has hung the ominous shadow of opposition by nature lovers and huntsmen.

Into the melee has come a new voice, that of Plant Sociologist Frank E. Egler of the American Museum of Natural History. His message seems so pertinent and logical that we feel impelled to quote from it here:

"Brush," he said, "is looked upon as the symptom of disease—not the disease itself. The worker aims to destroy the basic sources of the disease. This implies covering the land with such cover types as tend to inhibit unwanted trees. 'Conversion' is the procedure of obtaining the most desired plant covers.

"Conventional practices have almost always been involved with conversion with no awareness of future 'maintenance.' The time to plan for 'maintenance' is at the time of 'conversion.'

"Bull-dozing, sheer-dozing, discing have been tried. This treatment is exactly what the forester recommends to encourage tree reproduction.

"Blanket spraying in many cases reduced costs per acre. But the unfortunate killing or serious damage to shrubs, broadleaved herbs, or grasses has gone completely unnoticed. They are the very plants capable of reducing maintenance cost in future years.

"Selective spraying is recomended because:

1. The root kill is significantly higher.
2. Tall brush, and even large trees, can be killed.
3. Drift damage is minimized.

"Precise spot-spraying permits protection to plants which form future covers. This future cover can allow tall shrubs on the side and a foot trail in the center. Such designing reduces 'conversion' costs and minimizes future 'maintenance.'

"A simple set of rules cannot be developed, even for a single state. On the other hand, time and trial are gradually eliminating the strong objectives of several years ago. The needs of the utilities are being met. Conservation values are added in. Suitable personnel is found for selective spraying in the dormant season. And costs are found competitive with other chemical techniques.

"The rights of way, while still fulfilling all the needs of the public utilities, could become a tremendous asset in the field of soil erosion, watershed values, and wildlife management."

Our aim in quoting Mr Egler is not to join the ranks of those who specifically espouse one chemical technique over all others. That is a decision for those who pay for treatment and live with what they buy. But we like his contention that proper brush control enhances the part that well-cleared rights of way can play in conservation. We hope that quoting him here will stimulate the planning of all utilities to the point where their rights of way will win them favor in the eyes of their public.

Sell—and Sell—and Sell

The lady in the kitchen is making a cake. She has put all the ingredients together in proper proportion. But what she has in the pan is not a cake. It's just a sticky mass of batter. It won't be a cake until it is cooked, until the heat has been put on it.

In this country are all the ingredients for a cake of continuing rise in level of living with its attendant increasing strength of the national economy. Ability to produce consumer goods and ability to buy them are the ingredients of our cake. But they will not be a cake—only a sticky mess—if we do not put the heat on them—the heat of selling.

Practically every maker of electric appliances has announced intention to boost 1953 production above that of 1952. And as defense and new plant spending decline and steel and other basic materials become available in greater quantity for consumer goods, ability to manufacture appliances will rise in proportion. Will the electrical industry have a sticky mess of piled-up inventories, cut prices, all the ills of overproduction on its hands, or will it have a cake of continuing prosperity? It can have a cake if it will cook it, apply the heat of Sell—and Sell—and Sell.

Reforestation Is Worthy of Praise

Where once in southeastern Ohio there were hundreds of acres of lands devastated by strip mines, there are now hundreds of acres of growing saplings. Behind this change was the Ohio Power Co which for its work was recently honored by the Ohio Forestry Association with its annual forestry award. In terms of community welfare, civic responsibility, and public relations this is no light honor. Any company willing to heal the manmade scars on the face of Mother Earth is worthy of praise. And in time Ohio Power will get its reward for its worthwhile contribution.

THE ELECTRICAL WEEK

The Issue's News Highlights—Depa releases a list of 43 utilities that have received top priority on material and equipment for power plants supplying AEC projects.

So little opposition to New York Power Authority's bid to build the U. S. half of the St. Lawrence power project developed at the final FPC hearing that it looks certain the authority will get its license.

Off the Washington Wire—Interior Department along with several other federal agencies failed to meet the March 2 deadline for submitting its revised budget to the White House. Meanwhile Interior agencies continued to present the budget requests to Congress based on figures prepared by the former Truman Administration. Officials of Southeastern and Southwestern Power Administrations appeared before House Appropriations subcommittee March 4 and 5. Bureau of Reclamation and Bonneville Power Administration are to appear March 17.

REA electrification loans temporarily are being held to the January level of $9.8 million, and co-ops are beginning to protest. A Senate subcommittee has recommended that $15 million be shifted from the electrification to the telephone loan fund.

Looks as though electric companies may be in for a fight to get the full benefits of accelerated tax amortization on new generating plants. FPC hearings are set for March 11 on how to treat fast amortization in connection with rate making. Several parties are urging that rates take into account only the actual tax paid . . . Rumors persist, but apparently with little foundation, that Lt Gov Encher Nelson of Minnesota, is slated for a position in connection with the rural electrification program . . . Six Bureau of Reclamation engineers are on their way to Formosa to study potential hydroelectric sites.

Puget P&L's Pres Frank McLaughlin and WWP's Pres Kinsey Robinson met in New York City last week discussed possible merger of their companies.

From New England—Nantucket G&E gets Massachusetts Department of Public Utilities approval to sell $400,000 of 4% bonds . . . Maine PUC Chairman Frank E. Southard resigns because State Supreme Court overruled PUC in New England T&T rate case.

Progress toward completed negotiations between the union and a group of New England Electric System gas and electric companies north of Boston (not Boston Edison as reported in EW, Feb. 23, p 93) is being made. Dean W. G. Sutcliffe of Boston University, serving as moderator under Schlicter Law, was given a week's extension of his duties following tentative agreement on all major issues. A 6% wage increase has been offered the union. Local union members will have to vote on the proposals before the proceedings are closed . . . A 6% wage increase has been offered Narragansett Electric workers. Local union members were scheduled to vote on the offer the latter part of last week.

Dividend increases—Power Corp of Canada will pay March 31 a common dividend of 50¢ a share as compared with 40¢ a share previously . . . Middle South Utilities, Inc, will pay April 1 a common dividend of 35¢ a share as compared with 32½¢ in previous quarters.

Labor—Two-week strike ends at the Pikesville District of Kentucky & West Virginia Power as Circuit Judge Jean L. Auxier issues a temporary restraining order enjoining picketing by about 30 employees out of a total of 70 union eligibles. Company refused to recognize District 50, United Mine Workers Union without a NLRB election . . . Dayton P&L has signed a contract with UWUA, CIO, retroactive to Oct. 27, 1952 for 6½% wage increase to employees or for 10¢ per hour, whichever proves best for the employee.

Legislation—Senate Bill 24 is introduced in Ohio General Assembly to substitute "fair value" formula for "reproduction cost less depreciation" in rate case procedures before PUC. House Bill 15 is introduced to change the utility rate-making clause by taking one-half of original cost of physical properties and one-half of reproduction cost as the new rate formula . . . New Mexico's Governor Mechem submits to legislature a proposed constitutional amendment which would merge the Corporation Commission and PSC into a single five-man appointed commission.

Rates—Municipal League is investigating Seattle City Light's new rate schedule, charging that base-period plan is out of line and results in excessive rates for commercial and large residential users . . . Because industrial customers are paying an average of $418,000 a year more now than in 1945, Union Electric of Missouri has revised its rate applications to increase rates $6,326,000 instead of $6,744,000 a year. Missouri PSC has set hearings for April 27 and Illinois Commerce Commission for May 7 . . . Union Light, H&P gets temporary restraining orders permitting it to continue charging about $935,000 more a year in electric and gas rates until Judge W. B. Ardery holds a hearing in the case.

Because of separation of Duquesne Light and Equitable Gas, as required by law, the monthly joint meter reading procedure which was possible under combined operations of companies must be abandoned, Duquesne Light has announced. Duquesne is planning to discontinue monthly meter reading for residential and small commercial customers in order to avoid substantial increases in operating costs. Meters will now be read every three months. To enable customers to pay monthly, a statement will be sent, between three-month billing periods, for approximately the amount of his average monthly bill.

Congratulations—Brockton, (Mass.) Edison elects L. F. Eaton operating vice president . . . L. T. Smith, vice president and assistant to general manager, becomes vice president and general manager succeeding Vice Pres L. C. Parks who becomes assistant to president.

Top Priority to Plants Supplying AEC

Forty-three electric utilities get federal certification to obtain material and equipment on same basis as direct atomic and military installations

For the first time during the present emergency, 43 electric utilities are using priority ratings equivalent to those given direct military and atomic energy developments to obtain materials and equipment for 50 generating projects.

Seventy-one units are covered by this E-5 rating, granted by Defense Production Authority just before its merger with Office of Defense Mobilization. Administration of the priority program is being handled by Defense Electric Power Administration and National Production Authority.

The ratings enable constructing utilities to use top government priority procedures to obtain all controlled materials and equipment necessary to completion of the designated units. With one or two possible exceptions, all units thus covered will serve interim, firm or backup power for atomic energy installations.

A list of the projects covered by the new priority rating follows:

Company, Plant and Unit	Capacity (Mw)	Scheduled Service Date
Ohio Valley Electric Corp		
Kygar Creek (Unit 1)	176	1Q 1955
Clifty Creek (Unit 1)	176	1Q 1955
Cincinnati Gas & Electric Co		
Beckjord (Unit 3)	125	4Q 1954
Cleveland Electric Illum. Co		
East Lake (Unit 3)	100	1Q 1954
Duquesne Light Co		
Elrama (Unit 3)	100	2Q 1954
Indiana & Michigan Elec. Co		
Tanners Creek (Unit 3)	176	3Q 1954
Indianapolis Power & Light Co		
White River (Unit 5)	60	1Q 1954
Louisville Gas & Electric Co		
Cane Run (Unit 1)	80	2Q 1954
Monongahela Power Co		
Albright (Unit 3)	125	4Q 1954
Ohio Edison Co		
Burger (Units 4 and 5)	135 each	3–4Q 1954
Ohio Power Co		
Muskingum (Units 1 and 2)	176 each	1953 and 1Q 1954
Public Service Co of Indiana		
Wabash River (Units 3 and 4)	90 each	2&3Q 1954
West Penn Power Co		
Springdale (Unit 8)	125	2Q 1954
Southern Indiana Gas & Elec. Co		
Culley (Unit 1)	40	1Q 1955
Tennessee Valley Authority		
Shawnee (Units 5 to 9)	135 each	1954 & '55
Kingston (Units 1 to 4)	135 each	1953 & '54
Kingston (Units 4 to 8)	180 each	1954 & '55
Colbert (Units 1 and 2)	180 each	4Q 1954
Widows Creek (Units 5 and 6)	113 each	2–3Q 1954
Carolina Power & Light Co		
Wilmington (Units 1 and 2)	100 each	2&Q 1954, 1Q 1955
Duke Power Co		
Riverbend (Units 6 and 7)	125 each	3–4Q 1954
Virginia Electric & Power Co		
Portsmouth (Unit 2)	90	3Q 1954
Alabama Power Co		
Barry (Unit 2)	125	2Q 1954
Georgia Power Co		
Hammond (Units 1 to 3)	100 each	1953–1954
Florida Power & Light Co		
Cutler (Unit 5)	60	4Q 1954
City of Jacksonville		
Southside (Unit 3)	40	1Q 1955
Electric Energy Inc		
Joppa (Unit 5)	125	1Q 1955
Illinois Power Co		
Vermillion (Unit 1)	60	1Q 1955
Union Electric Co of Mo.		
Meramec (Unit 2)	110	1Q 1954
Central Illinois Pub. Service Co		
Hutsonville (Unit 4)	60	1Q 1954
Commonwealth Edison Co		
Ridgeland (Unit 4)	150	2Q 1954
Public Service Co of Northern Ill.		
Will County (Units 1 and 2)	150 each	3–4Q 1954
Wisconsin Electric Power Co		
Oak Creek (Unit 2)	120	2Q 1954
Wisconsin Public Service Co		
Weston (Unit 1)	60	3Q 1954
Arkansas Power & Light Co		
Cecil Lynch (Unit 3)	100	1Q 1954
Couch (Unit 2)	100	1Q 1954
Empire District Electric Co		
Riverton (Unit 8)	40	1Q 1954
Gulf States Utilities Co		
Louisiana (Units 2A and 3A)	40 each	2Q 1954
Kansas Gas & Electric Co		
Neosho (Unit 3)	60	3Q 1954
New Orleans Public Service, Inc.		
Industrial Canal (Unit 4)	65	2Q 1954
Public Service Co of Okla.		
Southwestern (Unit 2)	60	2Q 1954
Southwestern Gas & Electric Co		
Lone Star (Unit 1)	40	1Q 1954
Central Power & Light Co		
Lon C. Hill (Unit 1)	60	1Q 1954
Dallas Power & Light Co		
Dallas (Unit 3)	60	1Q 1954
Houston Lighting & Power Co		
Webster (Units 1 and 2)	80 each	1–3Q 1954
San Antonio Public Service Bd.		
Northside (Unit 1)	60	3Q 1954
Southwestern Public Service Co		
Plant A (Unit 1)	40	2Q 1954
Moore County (Unit 3)	40	3Q 1954
Texas Electric Service Co		
Eagle Mountain (Unit 1)	110	2Q 1954
Morgan Creek (Unit 4)	60	2Q 1954
Texas Power & Light Co		
Rivercrest (Unit 1)	80	2Q 1954

NW Firms Fail to Pick Up All Interruptible Energy

Aluminum and chemical industries in the Pacific Northwest are still in no rush to take back all of the interruptible energy available since the end of the power shortage, even though they no longer have to pick up the bill for steam generation. Bonneville Power Administration reports that this class of customer has bought 305,000 kw although 400,000 kw of interruptible hydro power is now available on an around-the-clock basis.

Surcharges ended Feb. 1 when steam facilities were no longer needed to bolster power production, but buyers of interruptible energy had already used and paid a surcharge on 52,597,000 kwhr. The surcharge brought the average cost to 6 mills per kwhr instead of the average 2.5 mills charged for hydro-interruptible.

BPA said marketing conditions for aluminum appeared to be the major influence in the reluctance of plants to pick up larger amounts. Load forecasts indicated, however, that by April 1 the industries will have picked up an additional 91,000 kw.

The impact of January rains on the western coastal range and piling snow on the Columbia Basin watershed turned the attention of Bonneville officials to the months ahead. In a report to the Columbia Basin Interagency Committee, William A. Dittmer, BPA power manager, said water supply outlook indicated the region probably will be able to run on hydroelectric power until late 1953 when "a little peaking steam" may be required.

Co-op Plan for Clark Hill Power

Georgia organization seeks right to buy all of state's share of output from new hydroelectric plant

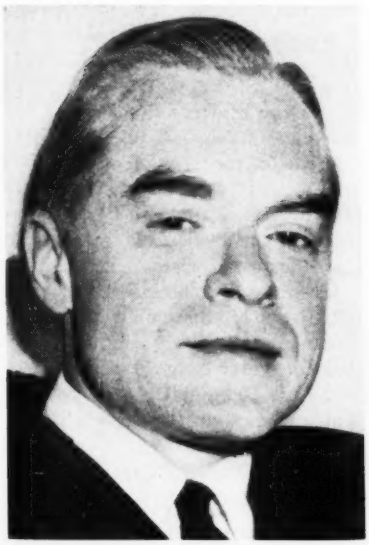
Georgia rural electric cooperatives have come up with a plan for carrying power from the government-owned Clark Hill Dam to their members.

As presented to Interior Secretary Douglas McKay recently, the co-op proposal is in direct conflict with a contract offered earlier this year by Georgia Power Co.

Main points of the co-op plan are as follows:

- Georgia Electric Membership Corp, a statewide organization of 37 individual distribution co-ops, would purchase all of Georgia's share of the Clark Hill output.
- The statewide organization would, in turn, contract with Georgia Power for transmission of this output to member co-ops and far sale of surplus power to the company.

If found feasible, the co-op plan offers another dimension to a controversy which may help shape Republican power policy. Until this development, Secretary McKay had only the Georgia Power offer to consider (EW, Jan. 26 p 125). His responsibility is to market power from the Clark Hill project on the Savannah River, giving preference to public bodies and cooperatives.



GORDON CLAPP

G. O. WESSENAUER

Georgia Power Offer . . . Georgia Power had offered to purchase the portion of the power and energy allocated to Georgia and transmit it at low rates to customers designated by the Interior Department. This contract was turned down during the last weeks of the Truman Administration on the grounds that it did not meet the minimum requirements of federal power policy. Former Interior Secretary Oscar L. Chapman, who made the decision, held that the government should either construct transmission lines to serve preference customers directly, or negotiate "wheeling contracts" with the company to carry the power to the customers.

Georgia Power balked at the "wheeling contracts," arguing it wanted to retain its hard-earned customers. It renewed its offer to the Eisenhower Administration in early February.

Co-op officials headed by D. Marshall Pollock, new president of the statewide organization, say they have negotiated no contracts with the company. Yet, they maintain they propose no expenditure for construction of transmission lines or thermal plants to firm the Clark Hill Power. They appear to believe the company will enter into "wheeling" and firming agreements with the co-ops, although it has been adamant in its refusal to enter such contracts with the federal government.

Plan Laid Before McKay . . . This new proposal was put before McKay in mid-February by Pollock, Walter Harrison, and four other officials of the Georgia Electric Membership Corp. They were accompanied to his office by Rep Henderson Lanham of Georgia.

Pollock reports that Southeastern Power Administration, an Interior agency, is now making a study of the co-op proposal. In addition, the statewide co-op has retained Southern Engineering Co to make a study of the plan.

Pollock and his group claims that the Georgia Power offer would result in savings to the company of some $1.5 million per year if the Clark Hill power is used for peaking purposes. Georgia Power in the past has maintained that its offer would result in little, if any, profit to the company. It has said it is willing to make a sacrifice to keep its customers.

TVA Men Recovering After Crash

Two top Tennessee Valley Authority officials were still in a Bristol, Tenn., hospital last week recovering from injuries sustained in a plane crash Feb. 24.

More seriously injured was TVA Board Chairman Gordon Clapp who suffered fractures of his pelvis and one arm and several ribs. He may be in the hospital for several weeks.

Manager of Power G. O. Wessenauer suffered a fractured vertebrae and a broken nose. He was expected to be released this week.

A third TVA official, Budget Chief John H. Clark, received minor injuries and shock in the crash but was released from the hospital.

The twin-engine TVA plane went down as the pilot attempted to complete an emergency instrument approach at Tri-Cities Airport, after both engines had failed. The threesome were enroute to Knoxville after appearing before Congressional appropriations committees in Washington. They had asked that limitations be raised on TVA travel expenses.

License to N.Y. Seems Assured

Final hearing on St. Lawrence project before FPC examiner indicates Power Authority will get the nod

License for the St. Lawrence power project seems certain to be issued to Power Authority of the State of New York.

Opposition to the New York application had melted to little more than formal protests as oral argument concluded before a Federal Power Commission examiner Feb. 27. Notably absent from the proceeding was any hint of opposition from federal authorities.

Next step is up to FPC Examiner Glen R. Law, who turned down a similar application in December 1949. At that time he recommended that the federal government undertake to develop both the power and navigational projects on the St. Lawrence. Law's decision on the present application is expected within the next month or two.

The decision is subject to review by the full Federal Power Commission either on appeal or upon its own motion. Because opponents offered little evidence during the hearings on the present application, lawyers in the case consider it unlikely that an FPC decision will be taken to the courts.

If granted, the license would permit the New York Authority to construct a power plant with installed capacity of 940,000 kw and other facilities in the International Rapids Section of the St. Lawrence. Total cost of the authority is estimated at $260,850,000. The Hydro-Electric Power Commission of Ontario would build a similar plant on the Canadian side of the river and share in the cost of some of the works on the U. S. side. License requested by New York does not contemplate any U. S. participation in the construction of the navigational part of the project.

U. S. Not Out . . . However, the U. S. has not entirely dropped the idea of joining with Canada in building the proposed seaway. A Senate foreign relations subcommittee has been set up to study this possibility, although no hearings have been announced. The bi-partisan subcommittee is composed of Republican Senators Alexander Wiley of Wisconsin, Robert A. Taft of Ohio and William Knowland of California and Democratic Senators Walter F. George of Georgia, John Sparkman of Alabama and Theodore Green of Rhode Island.

At the oral argument on the FPC license, Orrin J. Judd arguing for the authority said Congress had declined to approve federal construction of the power project.

"The limit of patience has been run," Judd said in referring to Congress's failure to act.

He pointed to several bills now pending which are based on the assumption that New York will build the U. S. portion of the power project.

The authority lawyer, who is a special assistant to the New York solicitor general, also attempted to meet other arguments posed by opponents of the New York application. His main points:

- There is no New York statute which prohibits the federal government from exercising its decision to "recapture" the proposed project upon expiration of the license.
- The New York application asks for a license for a project lying entirely within the U. S. and FPC has the full authority to grant it.
- It would be "improper"for FPC to write into the license the requirement that power be sold in line with "preference clauses" contained in several federal statutes. New York law, which seeks to distribute power to "rural and domestic consumers" is more equitable than the federal law.
- Annual fee for administration of FPC's regulatory measures on the project should be around $72,500 rather than $162,000 as proposed by the FPC staff.
- Public Power & Water Corp of Trenton, N. J., has shown no financial ability to undertake the project it had proposed in an application which directly conflicts with the New York application.

Attorney for the Trenton company appeared at the oral argument in behalf of the conflicting application. He again pointed to the additional navigation aspects which are proposed by his company. However, this company has failed to produce any witness to testify on the economic feasibility of its plan.

Staff of the commission supported the New York application (EW, March 2, p 6). Staff Attorney Willard W. Gatchell told the examiner, "Actions taken on both sides of the border now leaves the decision squarely on the doorstep of the Federal Power Commission."

He also argued that New York's plan to sell the power is equitable and FPC has no authority to write a "preference clause" into a license. He said the commission would need specific statutory authority to move in this field.

Those Opposed . . . Opposition came from coal interests which held that the power project would cut into coal markets in the area of the project.

National St. Lawrence Project Conference, an opposition group, representing coal interests and Atlantic and Gulf ports, argued that New York law would prevent the federal government from "recapturing" the project upon expiration of the license. This group's opposition is supposedly based on the proposition that a St. Lawrence Seaway would adversely affect present coal marketing and port use, but no evidence to that effect has been presented.

Briefs for the injection of a "preference clause" into the license were filed by American Public Power Association and National Rural Electric Cooperative Association.

Lawrence Potamkin, representing NRECA, asked that public bodies and cooperatives be given priority in purchase of power from the project. "As to the use of a public asset," he said, "public bodies must come first."

TVA Aides Participate in Course at University

Florida State University at Tallahassee has gone in for a case study of Tennessee Valley Authority. On invitation of the School of Public Administration members of the TVA staff are presenting the case study during this semester. Senior and graduate students are enrolled in the course which continues through April.

The TVA course is similar in scope to that presented last year by the U. S. Department of Commerce. Gordon R. Clapp, TVA chairman, opened the course last month with lectures on the significance of the TVA.

The university pays travel and living expenses of the TVA members participating in the course.

EEI President Signs Coffin Citations

First of the new Coffin Citations is signed by Bayard L. England as Ralph J. Cordiner, president of General Electric Co, looks on. The citations are to go to the five electric companies which are competing for the Coffin Award. This will be presented at the coming annual convention of the Edison Electric Institute.

The companies are Arkansas Power & Light Co, Carolina Power & Light Co, Detroit Edison Co, Electric Energy, Inc, and Pennsylvania Power & Light Co.

Oil Explosion Knocks Out 220,000-Hp Ontario Plant

An oil circuit breaker exploded March 2 at the Chats Falls Plant of Ontario Hydro, causing a $1.5-million fire that put the 200,000-hp plant out of service. Cause of the explosion was not immediately determined.

One 57,000-kw generator and a number of cables were badly damaged at the hydro installation, 30 miles south of Ottawa. Hydro shed industrial load in the area for a time, a spokesman said, but service was restored as steam plants in the Southern Ontario system picked up the load. Damage to roof and walls will be repaired and all units will be back on the line "in a few days", the spokesman said.

The blaze, which began at 7 am, was brought under control by 10 am. Hydro officials estimate damage will run to between $1.5 million and $1.75 million.

The Chats Falls Plant is owned and operated jointly by Hydro-Electric Power Commission of Ontario and Ottawa Valley Power Co. It was first placed in service in 1931.

Norfolk Service Center

Virginia Electric & Power Co will construct a $1.3 million service headquarters building at Norfolk, Va. The new structure will provide space for consolidation of the utility's gas and electric service departments. About 400 persons will be employed at the service center.

Surcharge Suit

Oregon legislator makes complaint to PUC against Portland General Electric rates

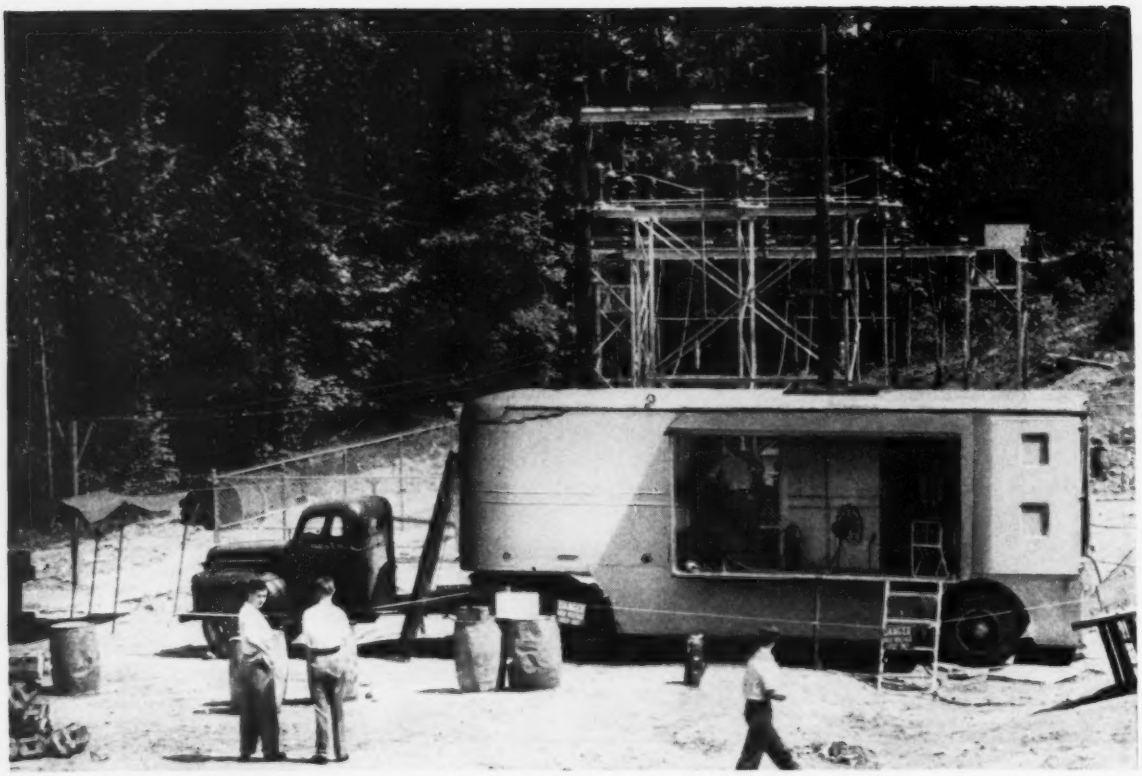
While Secretary of the Interior Douglas McKay and top Bonneville Power Administration officials conferred in Washington on ways to spread auxiliary high cost steam power generation among both private and public utility customers, the maneuvering in the Oregon legislature over surcharges brought a formal complaint before the state utility commission calling for a complete review of the right of private utilities to levy the 11 to 20% on billings. The action was aimed directly at Portland General Electric Co.

State Rep Monroe Sweetland, Milwaukee, who has a bill in the house calling for public hearings prior to imposition of any surcharge, filed the complaint as a customer of PGE. Sweetland's bid resulted from a statement by Public Utility Commissioner Charles Heltzel that Sweetland's proposed bill was not necessary, that a hearing was provided for under existing law that also provided for appeals from PUC decisions to the courts.

Broad Charges . . . Sweetland filed a bill of particulars that went far beyond the surcharge question. PGE has until March 19 to file its reply and Heltzel expects it will be late April or May before a formal hearing can be scheduled.

The complaint of the Milwaukee legislator, who also is the Democratic national committeeman of Oregon and for this reason has been accused of political motives, not only questions the surcharge but calls for a review of PGE profits of the past several years, accuses the utility of inflating its rate base and operating expenses and claiming depreciations beyond intent of the Oregon law.

Calls Charges 'Groundless' . . . Portland General Electric Vice Pres Waldemar Seton declared the day after the complaint was filed that comment on Sweetland's accusations would serve no purpose except "contributing to Mr Sweetland's own personal publicity campaign." He termed the charges "groundless and irresponsible", said they would be answered at the hearing.



EMERGENCY SERVICE is supplied by "New Moon" for substation transformer change on the Duke Power System. The 500-kw, .8 power factor generator has carried up to 750 kva for short periods. This has cut outage time because of moving or replacing equipment

SHUT-DOWNS ON SMALL MUNICIPAL STATIONS OR INDIVIDUAL CIRCUITS ARE REDUCED BY . . .

Putting Power on Wheels

Homemade trailer unit with surplus airplane engine is light weight and low cost

J. E. **CHAPMAN**, Superintendent, Electrical Maintenance & Construction Dept, Duke Power Co, Charlotte, N. C.

The problem of costly shut-downs as a result of changing or replacing conductors, transformers, and other line and substation equipment has been solved by a 500-kw, 80% power factor trailer-mounted emergency generating station. This equipment has been used on the Duke Power System since the fall of 1949. It was used 7 times in 1950 (14,960 kwhr), 5 times in 1951 (4,240 kwhr), and 3 times in 1952 (3,200 kwhr).

Total weight of the trailer unit is 25,000 lb (with gasoline tanks full—900 gal, and 70 gal oil) compared with a similar capacity diesel unit having an estimated weight of 68,000 lb (without fuel, trailer or other equipment).

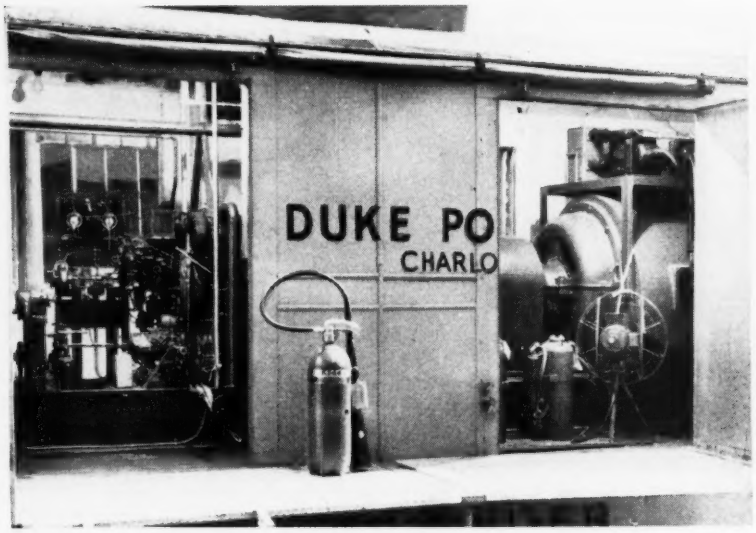
This emergency station, known as the "New Moon," was designed by the writer and constructed by the Switchboard and Switchgear Shop personnel at a cost of approximately $22,000. A standard Fruehauf trailer was used.

In 1950, average output per gal of gasoline was 6.21 kwhr. This figure was 4.44 in 1951 and 5.704 in 1952.

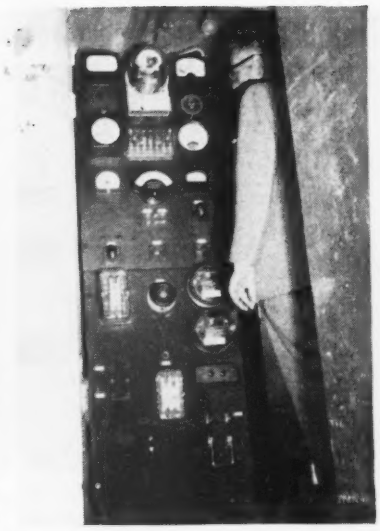
Engine . . . is from a war surplus P-51 plane—a liquid cooled (Glycol) Allison, costing about $150. Four engines were purchased to make sure that spare parts would be available. Engine is rated, 1,150 hp at 14,000 ft. Engine operates at 2,400 rpm (slightly above its rated or cruising speed of 2,300 rpm) and has a built-in 2-to-1 reduction gear to drive generator at 1,200 rpm.

Plugs are changed occasionally, but maintenance, in general, is low. The engine is started at least once a week to keep it in condition. It is quite noisy since any muffling system thus far suggested would cause sufficient back pressure to limit seriously the output.

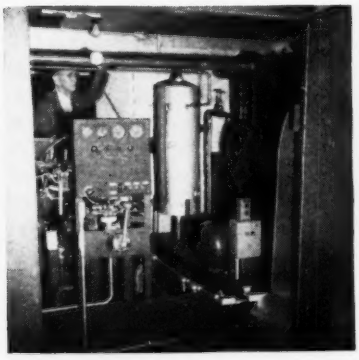
Engine Equipment . . . Cooling fans under roof and at sides of engine for exhaust stacks are standard power transformer fans.



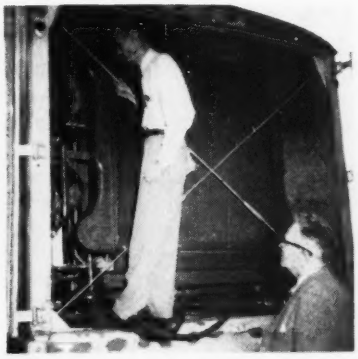
OPERATING PLATFORM is split at middle. Canvas awning protects personnel and equipment in bad weather. Potential and current transformers are mounted on top of generator at right



GENERATOR PANEL contains all the equipment for manual or automatic control



CONTROL PANEL for engine has standard aircraft cockpit instruments. Oil tank is at rear, 5-hp radiator fan motor at right



RADIATOR for engine cooling is similar to that used on diesel switching locomotives. The oil coolers for the engine are at left

COUPLING directly links generator (left) and engine (right). The latter, operated at 2,400 rpm, has a 2-to-1 reduction gear

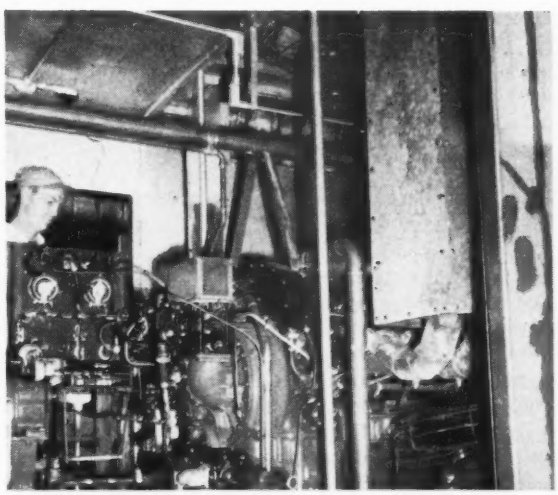
Engine is started by two 12-v automotive batteries, which also supply 24-v dc for control and governor.

The 900-gal capacity fuel tanks for the 100 octane gasoline used in the Allison engine are installed behind the skirts under the trailer. The 70-gal oil tank is mounted at the rear under the radiator.

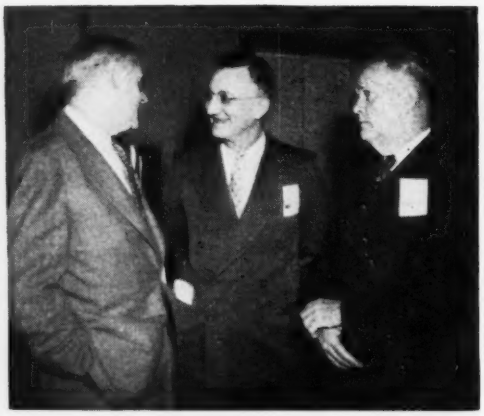
Control Panel . . . for engine is similar to that used in a standard P-51 cockpit. Instruments include: manifold pressure gage, gas pressure gage, oil pressure gage, and tachometer. The oil temperature gage is on the oil tank and cooling system temperature gage is on the upper pipe.

Generator . . . is 500 kva, 2,300 v, 3 phase, 3 wire and operates at 1,200 rpm direct coupled to the engine.

The generator panel has complete instrumentation and switching equipment including indicating and integrating wattmeters, synchroscope, test block, ac ammeter and voltmeter, field current and voltage overload relays, oil circuit breaker and field switch, field rheostat, manual or automatic speed control, overspeed lockout relay, etc.



REAR SIDE of the control panel shows the reduction gear motor which is operated from the propeller pitch governor. Rheostats regulate the governor speed. Note exhaust fans at roof and the exhaust stacks



PARTICIPATING in National Adequate Wiring Conference held in Chicago recently were (left panel, l to r) J. H. Jewell, Westinghouse Electric Corp; C. H. Christine, St. Louis Electrical Board of Trade; A. R. Hines, General Electric Co; R. J. Miller, Cleveland Electric Illuminating Co; (right panel) E. W. Commery, GE; C. T. Bremicker, Northern States Power Co, and E. B. Grant, Florida Power Corp

Need for Adequate Wiring Stressed

Electric utilities should promote adequate wiring because (1) continuing increase in residential energy use largely depends on it, (2) such a program makes friends for the utility, (3) safety in the home is thereby improved, (4) bettered trade relations result, and (5) national promotion must have local back-up to be effective. These five reasons were advanced by Carl T. Bremicker, vice-president, Northern States Power Co, at the National Adequate Wiring Conference in Chicago, February 26-27.

Largest yet, with more than 200 in attendance, the conference gave proof that the need for wiring capable of carrying the load imposed by rapidly increasing home uses of electricity is getting more attention from utilities, supplier of appliances, electrical contractors, and home builders. A. R. Hines, General Electric Co vice-president and chairman of the National Adequate Wiring Bureau, said, "It is important that we make sure that wiring is not a stumbling block in the way to sale of more electrical products."

Promotion Activities . . . The program of the bureau for 1953, in addition to enlargement of established activities, will include a special promotional package designed especially for electrical contractors. The bureau also is working on spot announcement films for local TV stations. These plans were disclosed by L. E. Barrett, Barrett Electrical Supply Co and chairman of the NAWB plan committee.

"Adequacy of wiring is not limited to expensive homes," said Dominick Dunn, appraiser, National Association of Real Estate Boards. "The workman does more living in the home than does the employer." He recommended that the bureau prepare a simple guide to give the appraiser a working knowledge of wiring, circuits, how to determine overloaded circuits, and other important facts about wiring.

E. W. Commery, General Electric, stressed the importance of promoting planned lighting and adequate wiring in the moderate price home, because these form the bulk of the market and it makes a much greater impression when one of these is sold than is the case with one of the more expensive homes where such things are expected.

Illuminated Demonstrator . . . An illuminated demonstrator for telling the adequate wiring story was described by Art Jones of Westinghouse Electric Corp. Floor plans of the home with wiring are shown by the demonstrator which Jones said cost about $50 to build.

Kilowatt hour sales increase in homes where wiring modernization has been sold has been 48% in a little over three years as compared to 25.8% in other homes in the same area for the same period, said J. M. Hollingsworth, Iowa Illinois Gas & Electric Co. The company has five wiring advisors, women, working in the field, one supervisor, a technician who makes layouts, and a record clerk, all working full time on the adequate wiring program. There are 60,000 residential meters in the area.

S. J. Roberts, St. Joseph Light & Power Co said his company's experience had been similar to that of Iowa Illinois Gas & Electric. The utility has 20,000 residential meters and has sold 1,789 wiring modernization jobs in 4½ years. A check of 300 customers one year after the rewiring job showed a 30% kilowatt hour sales increase compared to 7% average for all customers in the area.

Power Shortage in Japan

Power cut-offs in Japan are foreseen until the end of 1956 by Vice Pres Takezaemon Shindo of Electric Power Development Co. In 1956, he said, several new plants including the 350,000-kw station at Sakuma on the Tenryu River, will be completed to relieve the power shortage. Present hydroelectric facilities are unable to increase production because in most cases the plants are more than 20 years old. Scarce coal supplies have prevented expansion of output at coal-burning plants.

Innovations at Cromby Station

PEA prime movers committee hears Philadelphia Electric's new plant will have controlled circulation boilers

Philadelphia Electric Co's new Cromby Station on the Schuylkill River will have a dual-furnace controlled circulation boiler and inner-cooling for the generator of the second unit and numerous departures not previously applied in company plants.

An entire session of the Pennsylvania Electric Association prime movers committee in Philadelphia, Feb. 27 and 28, was devoted to study of their plant after a day similarly spent studying the company's Delaware Station (EW, Jan. 12, p 66).

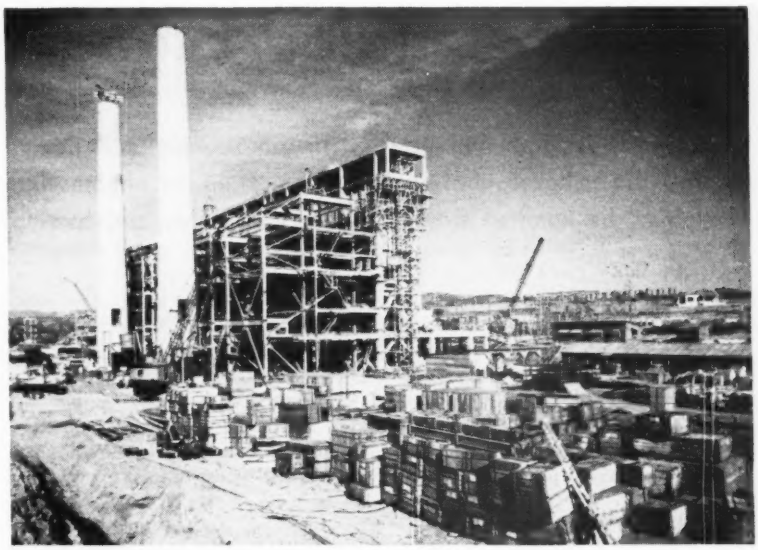
Operation of the first (150 Mw) unit at Cromby is set for April 1954 and the larger (200 Mw) unit for February 1955, according to Theodore S. Fetter, PE. The boiler beyond the burners and drum will be outdoors. Both machines will be 1,800 psig, 1000/1000 F triple exhaust compound with a 9,300 Btu expected plant rate. No. 1 boiler will be radiant-pressurized design for 1,050,000 pounds per hour. No. 2 will be rated at 1,450,000 pounds per hour with separate furnaces but a common drum. One will house the high temperature superheater, the other the reheater. Each convection pass will contatin half the low-temperature superheater and economizer elements. By resorting to controlled water circulation there will be considerably less weight of boiler and supporting steel.

Fetter added that it is not now planned to install more than the two units in Cromby because Schuylkill River flow may occasionally fall below full load circulating requirements. Meanwhile the likelihood of recirculation is being studied in a small scale model at Aldan Hydraulic Laboratory of Worcester Polytechnic Institute.

33 Similar Units . . . Including Cromby No. 2 there are now committed 33 controlled-circulation boilers totalling over 5 million kw ranging in size up to 250,000 kw, according to H. G. Ebdon, vice president, Combustion Engineering-Superheater Inc. Ten will be in service by the end of 1953. He traced the evolution from Montaup to the present and, while admitting that controlled-circulation has not been absolutely necessary at pressures that have prevailed, it will become increasingly valuable as pressures encroach upon the critical. Thermal head decreases with rising pressures and the problems of the boiler designer intensify in attempting to main circulation ratios without recourse to pumping, he said.

Ebdon enumerated several distinct advantages derivable from forced and controlled circulation: (1) Circulation is positive at start up when there is no heat; (2) control is exactly in proportion to heat absorption; (3) there are few and smaller temperature differentials; (4) water level varies little; (5) response to load is rapid; (6) water volume and metal mass are less; (7) hazards with tube failures are less and operation can usually continue; (8) continued circulation on shutdown affords quicker cooling and quicker access for maintenance; (9) less weld metal is required for the smaller diameter tubes; (10) there is a smaller mass of water to treat; (11) the drum is smaller and few separators are required; and (12) load can be imposed rapidly (e.g. 40 to 145 Mw in 40 minutes).

Amplidyne Regulation . . . No. 1 generator at Cromby will have Amplidyne voltage regulation and No. 2 the new Magamp high-speed response scheme, according to J. J. Ray who gave the electrical counterpart to Fetter's mechanical paper. His mention of the inner cooling of both stator and rotor of the No. 2 (200 Mw) machine was amplified by J. W. Batchelor, Westinghouse Electric Corp, who revealed the ducting details and the economic advantages. The benefits from going to 30, 60 and even 90 psi for the cooling hydrogen are accentuated when the heat of the conductors does not have to be dissipated through core iron and so much coil insulation. Current carrying capacity is stepped up several hundred per cent.



More Power for Greece

ATHENS (McGraw-Hill World News)—Aliveri thermo-electric station (above) is one of four power plants being built in Greece through cooperation of five nations. The plants are being constructed by French, British, Italian, and Greek contractors under the direction of Ebasco Services, Inc, New York. Greece's five-year power expansion program, doubling the nation's output, is being financed by $104 million in Marshall Plan aid and Italian war reparations.

Aliveri, the largest of the four plants, will go into partial operation in May. Ultimate capacity of the station, located on Euboea Island, will be 80,000 kw. Lignite will be used as fuel. The other plants are hydroelectric and are scheduled for completion about the end of this year.

SERVICE ENTRANCE and load regulator equipment—typical for residence having resistance heating. Flush type installation makes attractive appearance

HEAT PUMP UNIT installed in closet of residence. Unit is 5-ton size

Air Conditioning Loads Can Be Handled Economically

Properly designed and installed air conditioning, heat pump, and resistance house heating loads can, from an engineering standpoint, be handled with customer and utility satisfaction

G. L. KENNY, Jr, Supt of Transmission and Distribution, Florida Power Corp, St. Petersburg, Fla.

Air conditioning loads have increased rapidly in both Florida and the Southeast during the last few years. From 1947 through 1951, the summer peak of Florida Power Corp increased 127%, the winter peak 102%. The more rapid growth of the summer peak can be attributed directly to air conditioning. Air conditioning loads were added gradually, with commercial establishments and office buildings first and residences following close behind.

Distribution System . . . Air conditioning and heat pump loads introduce motor loads on the residential distribution system that are much larger than those before. The problem of supplying capacity for these loads is not the primary one. Flicker caused by motor starting currents is the foremost design consideration.

No doubt most of this equipment will, in time, become hermetically sealed. This will tend to minimize the disturbance to the system because of the reduced inertia and the resulting lower ratio of starting-to-running current of motors operating in refrigerant. However, abrupt voltage drops because of motor starting currents become objectionable when they reach a value of from 2 to 2½ v. Inadequately wired residences, as well as inadequately designed distribution systems, are sure to produce customer complaints.

To hold these complaints to a minimum, utilities must convince dealers and customers that air conditioners are not plug-in appliances but should be adequately wired and connected 240 v if satisfactory service is to be obtained. Package conditioners, at the moment, are powered by ½ to 1-hp motors with multiple motor installations used in the larger units. Complete air conditioners and heat pumps for residential use seem to fall mainly in the 5 and 7½-hp class.

How To Serve . . . When we consider serving these 5 and 7½-hp loads, we encounter a number of problems. Studies seem to indicate the utility can best serve these loads single phase. The manufacturer, on the other hand, leans toward three phase in his design. The three phase motor is cheaper, physically smaller, and more trouble-free. Here, again, we must sell dealers and customers on single-phase service or accept higher unit-cost distribution systems.

To serve these motor loads, distribution systems must be made up of fairly large transformer installations with short secondaries. No. 2 copper secondaries seem adequate, under 200 ft, if flicker is to be avoided.

Most of this equipment operates close to 70% power factor, which requires additional capacitors and probably means increased emphasis on secondary capacitors as these loads increase.

Banked Secondaries . . . The distribution engineer's best tool for combatting flicker is banked transformer secondaries. The industry has a record of having tried this connection only to discard it because of operating difficulties. It appears that air conditioning loads will force us to solve these difficulties and tap this last free reserve of capacity at our disposal.

At least one manufacturer has brought out a distribution transformer with two breakers allowing the isolation of a fault between adjacent stations without disturbing the rest of the network. More recently, another manufacturer has placed on the market a relay for installation at the midpoint of the secondary run providing isolation of a single transformer and its secondary. These are reassuring signs.

Overhead Networks . . . We have seen acceptance of the underground network to serve large important loads. Overhead three-phase networks, on the contrary, have never been accepted by the industry as a whole. Their excessive costs, due mainly to protectors and the capacity limits of pole-mounted transformers, coupled with the fact that the area so served sooner or later must become a part of the underground, are valid reasons for their non-acceptance. However, the network idea is sound and, in my opinion, the overhead single phase network is the answer as residential air conditioning and heat pump loads increase. It is doubly attractive because it does not require a complete conversion of the distribution system but may be developed as trouble spots occur.

Controlled Heat Loads . . . Florida Power has been serving controlled resistance-type heating loads since 1949. A cool night prior to this time always convinced us we were serving heat loads, but they were not of the controlled variety. Our controlled heat program was designed to serve this same type of load under the best possible conditions.

By controlled resistance type heat, I refer to a heating installation resulting in a controlled demand. These installations are engineered by our company, the wattage specified and kept to a workable minimum.

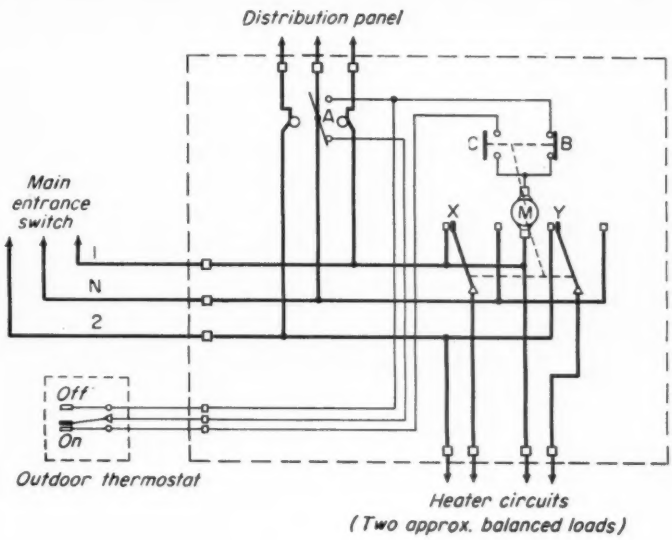
Three controls are used: Each individual heater has a thermostat set at approximately 70F, an outside thermostat is set at 60F, and a load regulator set at approximately 3 kw plus the water heater wattage. The heaters are normally connected 240 v but are transferred to a balanced 120-v connection by the load regulator, reducing the wattage to one-fourth its original value, whenever the outside temperature is above 60F or the other-than-heating load reaches the value of the load regulator setting.

Demand Charge . . . To make this effective, a clause was added to the residential rate. Space heating is permitted when installed in accordance with the company's recommendations. Space heating not complying with these recommendations will be subject to a demand charge of $1 per kw of demand, to be billed during December through April, both months included. Thus, by combining engineering and economic pressure, we achieve a heating installation which gives adequate service and provides a maximum of diversity.

Yearly observations on a group of eight installations chosen because they represent typical cases indicate the following:

The average demand due to heat for the group is 41% of the connected heating load. The maximum demand for any one of the group was 60% and the minimum 20% of the connected heating load. These were demands established during the months requiring heat as compared with months not requiring heat, or a true picture as far as additional demand due to heat is concerned.

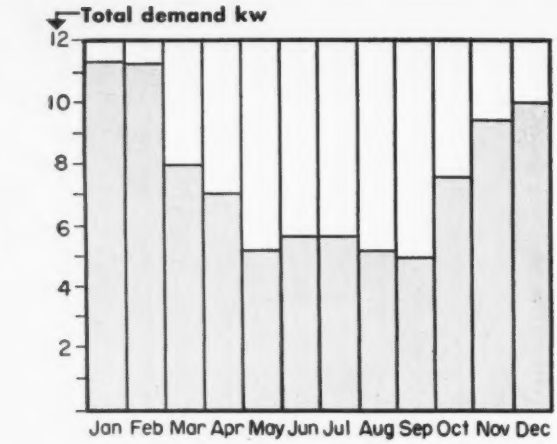
Heating Demands . . . Since the coolest parts of the day are not coincidental

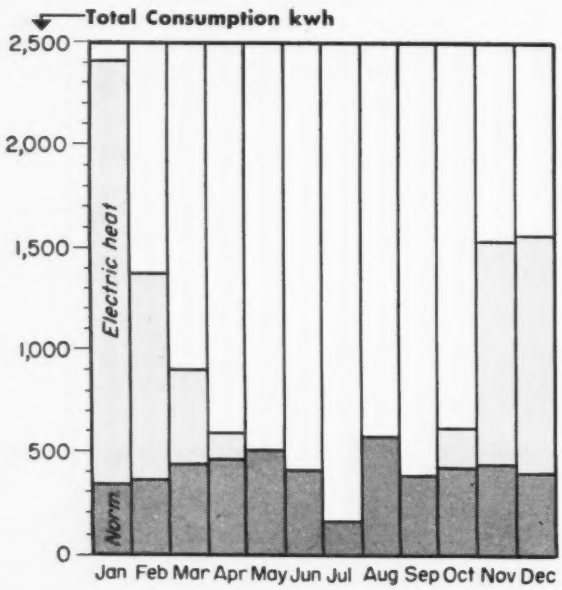


Explanation of Load Regulator Functions

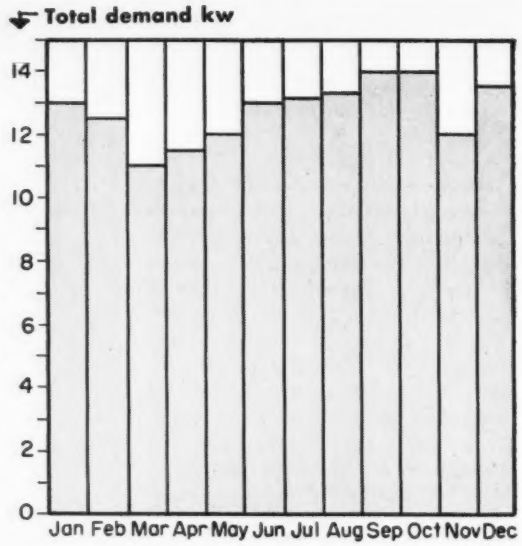
Consider drawing as condition No. 1. Heaters are energized at 240 v and the outside thermostat is in "on" position. Should outside thermostat change to "off" position, control motor "M" would be energized through contacts B. This would transfer X and Y to the neutral, open contacts B and close contacts C. Regardless of position of switch A, heating circuits would remain on 120 v.

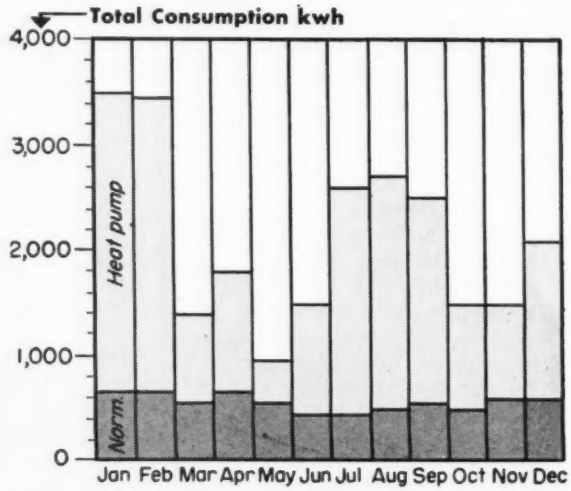
Return to condition No. 1 and consider switch A to shift due to other-than-heating load. The motor is energized through contacts B, transferring X and Y to the neutral, opening contacts B and closing contacts C, as above. Now, should switch A reverse, the motor would be energized through contacts C, returning the installation to condition No. 1.





DEMAND AND CONSUMPTION charts for 12,000-cu ft frame house in St. Petersburg, Fla. with 11 kw of controlled heat installed. Figures do not include water heating. Walls and ceiling have foil insulation





DEMAND AND CONSUMPTION charts for 12,000-cu ft frame house in Waycross, Ga. having 5-ton heat pump, 1-hp water pump and ¾-hp air handling equipment. Figures do not include water heating

with our system demand, these heating demands seldom occur at the time of system peaks and our experience has been that, by and large, these heating installations can be served without providing additional distribution transformer capacity.

Of course, consideration must be given to low installed capacity because of mild weather and, further, our experience is limited to single installations per transformer station. While it is possible to add demands of approximately 6 kw to some transformer stations without making changes, naturally, a number of these loads would present a difficult problem.

We believe that these loads, properly designed and installed, can from an engineering standpoint, be handled with customer and utility satisfaction and with a minimum amount of investment on the part of the utility.

Load Regulator . . . In reviewing our experience with controlled heat, there appears to be no reason why this load regulator idea can not be applied to air conditioning and heat pump installations, disconnecting the main compressor, over the residential other-use peak, leaving the circulating equipment in operation. This should not materially affect the efficiency of the installation, providing, of course, a wide-enough load band width is used to prevent intermittent starting and stopping of the compressor as the housewife clicks on and off range units. This combination should produce the high residential load factor so long desired.

Conclusions . . . Residential air conditioning, heat pump and resistance type heating loads are not new problems to utility distribution engineers. From the beginning, they have been changing their distribution systems to meet new demands for service. The ability of the system to handle new loads is dependent upon its basic design. A distribution system must, therefore, be flexible.

Adapted from recent Southeastern Electric Exchange paper.

Cool Transformers When—?

H. A. FOHRHALTZ, Power Transformer Engineering Div, General Electric Co, Pittsfield, Mass

Transformer cooling equipment should be operated for maximum utilization of both the transformer and its cooling equipment. For an OA/FA transformer with a 125% fan-cooled rating and one group of fans, the satisfactory starting point is 85C winding hot-spot temperature. For an OA/FA/FA super- fan-cooled unit with two groups of cooling fans, satisfactory starting points are 80 and 85C winding hot-spot temperatures for the first and second group respectively.

The designation OA/FA/FA signifies a transformer with a self-cooled and two fan-cooled ratings. These settings are justified by experience with starting hot-spot temperatures from 60-95C on many different designs of power transformers.

Load changes and their immediate affects govern the time of cooling fan starting. A given load at a given ambient temperature always produces the same final temperature conditions if sufficient time elapses. With early starting, at winding hot-spot temperatures of 70C or less, fan motors suffer excessive wear. With late starting, at winding hot-spot temperatures of 90-95C, the maximum allowable temperature as given in ASA guides may be exceeded, and insulation life reduced.

This temperature, of course, depends on percent load, duration of load, and ambient temperature. American Standard C57.11-1948 for liquid immersed transformers states the hottest spot copper temperature rise for continuous operation is 65C for Class A Insulation, provided ambient temperature does not exceed 40C and average ambient over any 24 hrs does not exceed 30C. Thus, the winding hot-spot temperature for any 24 hrs is 95C average and 105C maximum. These temperature values are the criteria for OA/FA and OA/FA/FA transformers.

Because of the difference in time constants of the overall transformer and the transformer winding, the cooling equipment should keep within allowable limits not only the steady-state but also any transient conditions.

With early starting—actuating cooling equipment at 70C winding hot-spot temperatures or less—certain loading conditions will cause the fans to run continuously or for many hours. For example, a transformer carrying less than rated self-cooled load might operate at 62C winding hot-spot temperature with fans running, at 75C winding hot-spot with fans off. Tests indicate the life of transformer insulation as measured by its tensile strength doubles for a 5-10C temperature decrease. The transformer would function much longer at 62C, but the fans would run continuously, shortening the fan motor life.

Don't Start Fans Too Early . . . Also, transformer obsolescence would occur when extremely long life is postulated. Weighing these factors leads to the conclusion that starting fans at 70C winding hot-spot temperature or lower is too early for effective use of transformer and cooling equipment.

With late starting—actuating fans at 90C winding hot-spot temperature or higher—the final temperature for maximum rated load at 30C average ambient will be the ASA "allowable temperature." But during load change the transient hot-spot temperature may exceed this maximum allowable value. Day to day repetition of this condition has an aging effect.

Also, a continuous load above self-cooled but below fan-cooled rating may cause the fans to cycle every few hours when more than 100% continuous self-cooled rating and 30C average ambient calls for continuous fan operation. For these reasons, starting at 90C winding hot-spot temperature or higher is too late for efficient operation of transformer units.

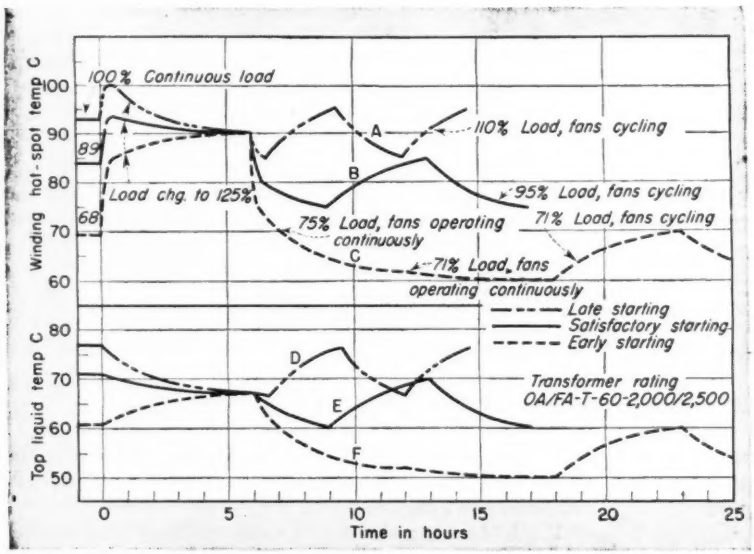
When to Start Fans . . . The most severe loading conditions that could occur within the maximum FA rating to obtain ASA allowable temperature conditions in the shortest time require:

1. The transformer at a continuous load such that the hot-spot temperature is just below the fan starting temperature.
2. A load change to its maximum rated forced-air value in a few minutes.

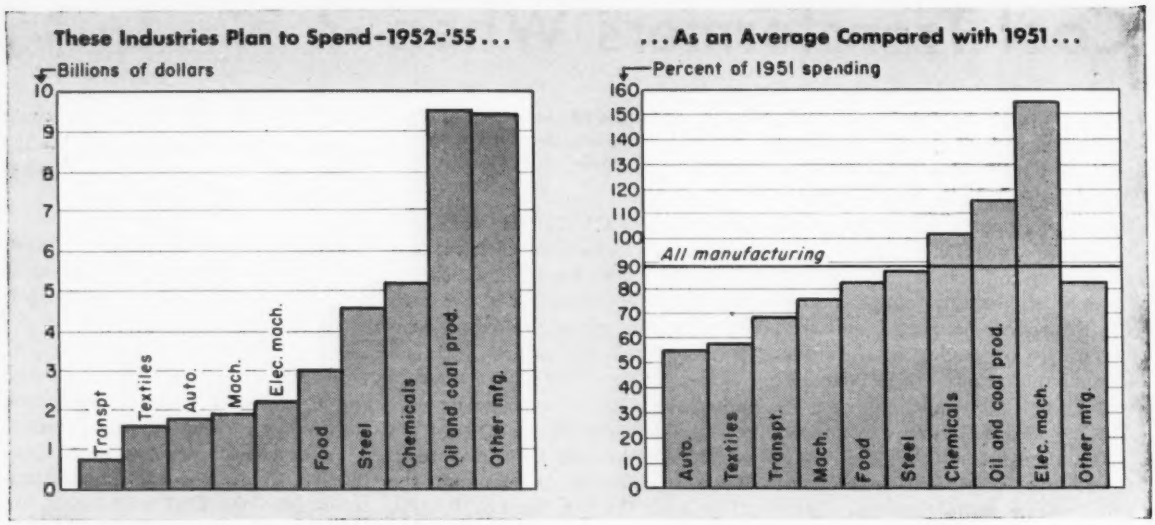
The diagram shows the different fan starting conditions with changing load conditions for a typical transformer. Fans operate at the following temperatures:

	On	Off
Late starting	95	85
Satisfactory starting	85	75
Early starting	70	60

A 10C on-off differential in the fan starting relay limits the cycling or hunting time of the fans. The best compromise between very short and relatively long cycling time is 10C.



FANS REGULATE hot-spot and top-oil temperatures under changing load conditions



How Cleveland Electric Illuminating Co. Makes . . .

Long Term Plans for Industrial Sales

Forecast of probable business and market research are essential before company objectives can be reached. Several methods are presented for determining where greatest amount of prospective business will be

R. C. HIENTON, General Sales Manager,
Cleveland Electric Illuminating Co

All industrial salesmen realize that the sales they make today will probably not result in increased kilowatthour sales for at least one to two years. They know the added revenue that will come from industrial sales next year is a result of equipment that has been sold during the past one or two years.

Because of this lag in realization of sales effect and in order to get the lowest cost per dollar of increased sales, we have devised several methods of determining where the greatest amount of prospective business will be, whether it is industrial, commercial, or residential.

I like to think of an industrial power salesman as the manager of his own individual business. One of the first duties of a manager is to plan, then organize to carry out the plan, then integrate his plan of action to eliminate waste motion, then make an appraisal of the results obtained.

Objectives . . . The first objective of the industrial salesman is to promote the use of electrical equipment in industry to the mutual advantage of industry and the company that we each represent. In other, and shorter words, get as much profitable business as possible.

A second objective is to build continually the impression in the mind of the customer that our own individual companies are needed for the overall good of his business and his community.

A third objective is to realize that we are the "power company" as far as our friends and neighbors are concerned and that our companies will be judged by our respective actions.

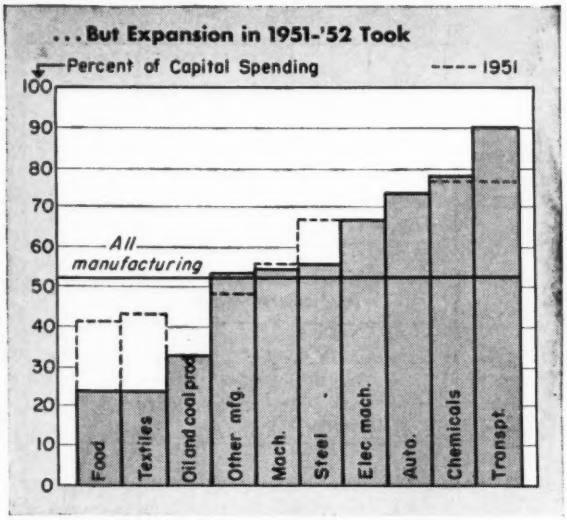
Reaching Objectives . . . We can reach these objectives by several methods. First, we can promote the sale of more kilowatthours by adding equipment to and increasing the use of present equipment in the plants of existing customers. This sounds relatively simple. But I find in any analysis of long-term industrial planning programs that even before companies decide what their objectives are they do market research to determine how to reach the objectives. In nearly all cases, market research is essential before the objectives of a company can be reached.

Market Research . . . You are probably saying, "My company has no market research department." It should make no difference to an enterprising industrial salesman whether his company does run a market research department or not. There are a number of business magazines—"Business Week" and "Chemical Week" for example—that will give him an idea as to the type of industry that is likely to expand the fastest in the next one, two, or three years, and also the type of industry that will have the greatest compound rate of growth in the next ten years.

Forecasting Sales . . . You may smile at the idea of forecasting industrial sales ten years ahead; however, many companies do so.

In discussing these long range planning programs with various companies, I always heard one common comment —"You're just a bunch of crystal ball gazers—you can't

Adapted from recent address at Interstate Power Club in New York.



forecast that far ahead." However, all companies reported that after the first year's experience, there was more acceptance and much more actual participation on the department level in assembling the data needed for a long-term plan.

If I were an industrial salesman again, I would do two things: First, I'd make a forecast of my probable business for the next three years, and second, I'd make my own market research.

Classifying Customers . . . I would divide my customers into accounts by size. In the Illuminating Company we make our distinction between big and little customers at 500-kw demand big or over. We have 270 big customers by this classification who comprise about 80% of the total industrial load. However, an analysis shows that 90% of our increased business comes from these big customers and that the average increase is much higher than the average increase of the smaller customers.

We are living in a dynamic economy today in which we have inflation, in which we have a tremendous amount of expansion. The larger companies are usually better able to withstand inflationary pressures than smaller companies, and the larger companies are usually better able to expand management levels—the key to profitable expansion—than smaller companies. A 500-kw demand may be too large or too small for your particular company or your particular territory, but in our company we realize the value of every customer, regardless of size.

However, if we're going to manage this industrial energy sales business of ours successfully, I'm fully convinced that we should classify all our customers by size, determined individually by each company or each territory.

Capital Expenditures . . . Next, I would classify my customers as to planned capital expenditures for 1952-1955, to see which companies fit into the classification of rapid expansion.

According to McGraw-Hill estimates electric machinery manufacturers will do 1½ times as much expanding in the next three years as they did in 1951. This should come as no surprise to those of us in the electrical industry because the machinery manufacturers will have to make a lot of equipment in order to use up the capacity that we are all installing. The accompanying charts illustrate the estimated expansion of other industries.

Markets . . . In our company we determine the percentage of the various industries that we have in our service area. This can be determined from our own records, which we check against the Ohio State Employment Service records.

Analysis of existing or potential industry may not be helpful to you, but I'm certain that a thorough analysis of your territory, its population growth, trends of population growth, and other factors that affect the economic life of your service area will be helpful in making a decision as to plan of action.

After deciding where our markets are, we should determine how to reach those markets at the lowest cost per unit of contact. That is a plan of action or organization.

Lost Motion . . . Integration is another step in managing our business. It merely means "Let's cut out the waste motion." I know an automotive manufacturer that put an ammeter on the electrical circuits running some 13 departments to check whether the men started to work on time or not. Since this company's production schedule was 450 cars per shift, the delay of a minute in starting, or quitting a minute early, meant the loss in production of one complete automobile. Makes no difference if we're only the lowliest salesmen on the totem pole, integration, or elimination of lost motion is a definite step in improving production.

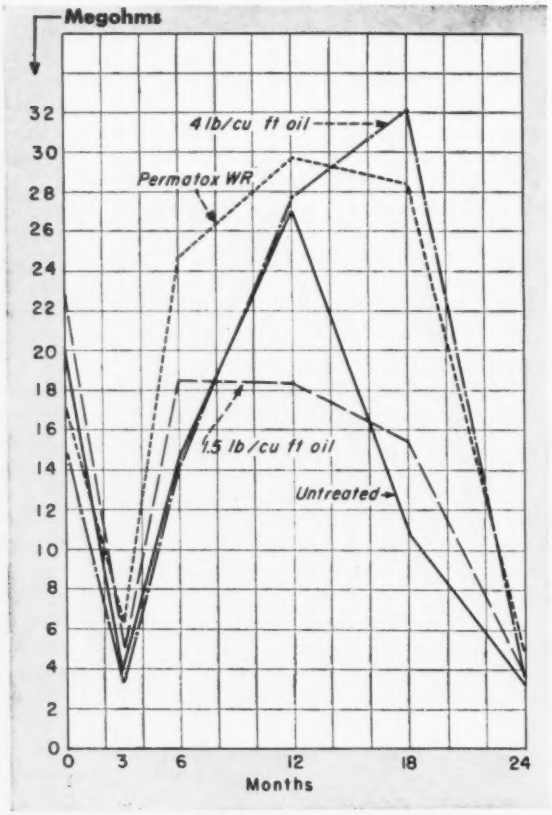
Control . . . Control to some people means checking expense accounts, checking mileage, checking this, checking that, and getting everyone dissatisfied who is being "checked." Control to me, as a salesman, means planning next day's calls, by making sure that I made those calls, and that I talked about something that would use electricity. Control to me as a manager means an overall appraisal of performance. It cost 22¢ to get a dollar of increased business in 1950, 17¢ to get a dollar in 1951, and 21¢ in 1952.

I look at the KWC, KWD, and EAR figures only as an indication of what we might get. At the end of the year we get "X" dollars in increased business, and it cost "Y" dollars to get them. We don't try to do this to individual territories because industrial sales is a team operation, and results should be judged on the entire department's activities.

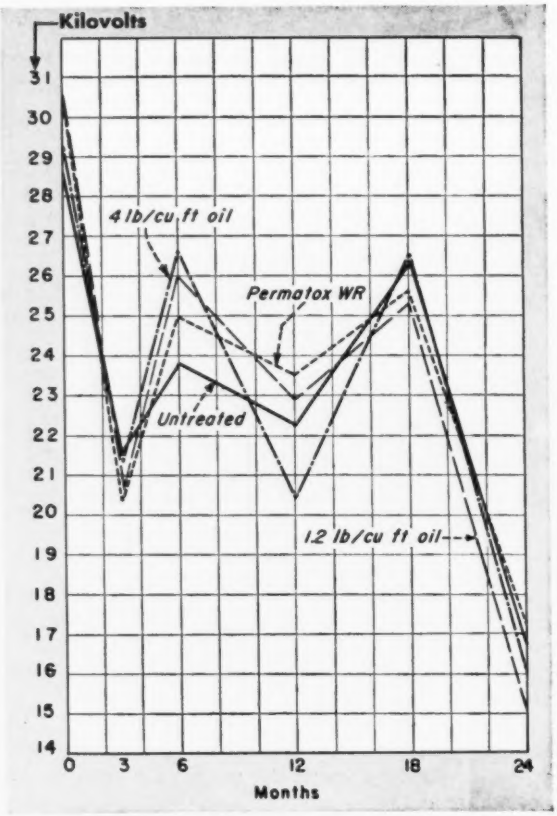
CEI Program . . . Our own company expects to be twice as big ten years from now as it is today. We have recently completed a review as to the proportion of residential, industrial, and commercial load at the end of ten years. During the next ten years, we expect the chemical industry will grow four to five times faster than the rest of the industry.

We think that steel will continue to grow. If it continues at the compound rate of growth of 3¼% per year per capita use for the last 20 years, then the steel production will be 50% greater than today. As production of steel increases, metal fabricating will increase. Ten tons of steel will produce one industrial job per year.

(*Continued on page* 174)



RESISTANCE OF TREATED ARMS resembles untreated. Their . . .



60-CYCLE FLASHOVER also is little affected

No Electrical Hazard From Pentachlorophenol

F. S. GLAZA, Engineering Dept, Texas Division, Dow Chemical Co, Freeport, Texas

R. M. GOOCH, Wood Preservation Lab, Dow Chemical Co, Midland, Mich.

Treating crossarms with pentachlorophenol does not effect their electrical properties, according to tests by Dow Chemical Co engineers. Treated and untreated crossarms, tested new and after exposure to industrial atmosphere, show moisture content to be the most important factor in determining crossarm resistance and flashover voltage.

Pentachlorophenol's value as a wood preservative is well known, but no data have been available on its effect on wood's electrical properties. Since linemen do hot-line work sitting or standing on crossarms, insulation safety is widely applicable.

Experimental work was started late in 1947 at the Texas Division of Dow Chemical. The treating solutions were 202 oil—a 5% solution of pentachlorophenol in an aromatic petroleum oil—and Permatox WR—a 5% solution of chlorinated phenols in a volatile solvent with a water repellent. Reference crossarms were untreated.

First, the insulation resistance was tested with a megger or high resistance bridge which measured the resistance of the wood to an electric current. Second, a 30-kv test set was used to make a 60-cps flashover test. Flashover is insulation failure by discharge between equally spaced nails driven ½ in. into the crossarms.

After the initial resistance and flashover tests, sets of crossarms were distributed in three areas which exposed them to atmospheres from magnesium chloride evaporators, chloride cells, lime kilns, acid furnaces, chlorinated hydrocarbon solvents and sea spray. The sets consisted of two crossarms containing 1.5 lbs of 202 oil per cu ft of wood, two crossarms containing 1.2 lb of Permatox WR per cu ft, one crossarm containing 4 lb of 202 oil per cu ft, and two untreated crossarms. The tests were repeated after 3, 6, 12, 18, and 24 months.

All data indicate moisture content is the most important factor in determining the electrical properties of wood. Resistance of untreated crossarms was usually less than that of the treated crossarms. There is no significant difference in the flashover between treated and untreated arms.

Both the resistance and the flashover tests show that there is considerably more variation from one test period to the next than there is between the treated and the untreated crossarms. From the 18-month test to the 24-month test, the average moisture content increased from 15 to 21%, while the average resistance dropped from 20 to 4 megohms and the flashover voltage dropped from 26 to 16 kv.

POWER BRIEFS

• Central Power & Light Co's office at Harlingen, Tex., suffered damage by water and smoke during a $500,000 fire which swept buildings in a half block of the downtown business area last month.

• Niagara Mohawk Power Corp plans to begin construction of three new hydroelectric plants in northern New York in 1953 and 1954. One is proposed for a site on the Black River at Felts Mills, Jefferson County, and the other two are to be on the Racquette River. Full details are not available on the plants and a spokesman for Niagara Mohawk emphasized the tentative character of the Felts Mills project.

• A fire late last month in a coal crushing device may delay work two months on a section of Ohio Edison Co's generating plant being built near Niles, Ohio. Rubber rolls and other material in the crushing equipment were set ablaze by sparks from welding torches. It will be necessary to remove much of the structural iron work in that section of the plant before repairs on the crusher can be made.

• Wisconsin Public Service Corp has received the George Washington Medal and $100 as a second-place winner in the Freedom Foundation Awards program for outstanding contributions to a better understanding of the American Way of Life during 1952. The utility was cited specifically for its program to "get out the vote" last fall.

• Philadelphia section of the American Institute of Electrical Engineers celebrated its golden jubilee last month at a dinner meeting. Horace P. Liversidge, chairman of the Philadelphia Electric Co, was keynote speaker at the celebration.

• United Nations Economic Commission for Europe (ECE) announced last month that a group of experts from Austria, Italy, Yugoslavia, and West Germany will study the possibilities of exports of electric energy from Yugoslavia. The experts, meeting under the chairmanship of a member of the ECE Secretariat, will study the economic, technical, financial, and legal aspects of the problem.

• Cost of changing from 25-cycle to 60-cycle power in Ontario may climb to $275 million, Ontario Hydro-Electric Commission Chairman Robert Saunders estimates. The original estimate for the job was $191 million. The cycle change-over is about 30% complete. Begun in 1948, the job is expected to take another eight years to complete.

• Pacific Gas & Electric Co plans to construct a $44-million steam plant at Morro Bay, San Luis Obispo County, Calif. First unit of the 300,000-kw station is expected to be in operation by 1955. Construction of the plant will begin this year.

• Bonneville Power Administration reported that during January federal power generation was 28% below January 1952. Grand Coulee generation was off 36%. BPA revenues for the month totalled $2,653,500, 22% below those for January 1952.

Fish Beseige Cleveland Utility Plant

Cleveland Electric Illuminating Co found itself unexpectedly in the fish business recently when millions of gizzard shad were drawn against the water intake screens at its Avon Lake Station. Operations at the plant were curtailed during the fish invasions and at one time the plant was out of service for several hours.

The trouble began on Feb. 16 when a sudden drop in the temperature of Lake Erie surface waters apparently stunned or killed millions of fish which were then drawn against the screen of the water intake pipe. At one point only one of the station's seven generators was able to operate. Then on Feb. 21 a second and larger invasion of dead gizzard shad were drawn against the screens, this time in such great number as to cut off water for condensers. The weight of the fish caused the screens to collapse and some of the fish were drawn into the condenser valves. The plant was out of service from 5:30 pm to 8 pm.

The utility employed dynamite offshore to break up schools of fish and a diver was used to clean the intake screen. But the most effective way of unclogging the intake was shoveling the fish away manually, as above.

ROBERT E. GINNA

HENRY B. SARGENT

Ginna Heads PIP Organization; Sargent Is Vice Chairman

Robert E. Ginna, executive vice president of Rochester Gas & Electric Corp, has been elected chairman of the Electric Companies Public Information Program. Henry B. Sargent, president of Arizona Public Service Co, has been elected vice chairman.

D. S. Kennedy, president of Oklahoma Gas & Electric Co, and Edward T. Gushee, vice president of Detroit Edison Co, have been added to the Steering Committee, governing body of the program.

J. B. Thomas, president of Texas Electric Service Co, had been serving as acting chairman of the program since the resignation last September of J. W. Parker. The Detroit Edison president, who served as chairman since PIP was organized in 1949, gave up the chairmanship following his retirement as head of the utility.

Ginna Says PIP Is Ready . . . "A new climate of public opinion has given the electric utilities one of the finest opportunities in our history to tell our story," the new chairman said following his election. "We also have an opportunity to demonstrate by word and deed our readiness and ability to meet the needs of the people. We will continue to fill the requirements of the nation for low-cost dependable electric service and to help raise the standard of living of all Americans.

"PIP is readymade to fulfill this responsibility in coordination with all of the other agencies and groups now serving the electric industry. We look forward in the coming year to intensified activity in bringing the accomplishments and aims of the electric utilities to the favorable attention of writers and commentators as well as our employees, stockholders, and customers throughout the nation.

"I urge the unified support of the electric industry, both individually and collectively, of the work not only done by PIP, but of EEI, ECAP, and NAEC, which in their distinctive ways are effectively bringing about a better public understanding of the electric industry. This is no time for complacency or standing on the sidelines. Let's all work for the common good of customers, employees, and stockholders."

A Veteran Utility Man . . . Ginna is a veteran in the utility industry. He entered it in 1921 as a draftsman for Brooklyn Edison Co. Later he served as an engineering assistant and rate research engineer.

In 1926 he joined the firm of Edward J. Cheney, New York consulting engineer, where he carried out assignments in utility valuation, depreciation studies, cost analyses, and other problems for the New England gas and electric utilities then managed by H. T. Tenney & Co. From 1930 to 1934 he did special consulting engineering work for a number of utilities.

Ginna joined the Rochester utility in 1934 as manager of the rate and economic research department. He became assistant to the president in 1940, vice president in 1945, director and member of the executive committee in 1949, and executive vice president in 1950.

Sargent from Mississippi . . . After spending 19 years with Mississippi Power & Light Co, during which time he rose from engineer to vice president and general manager, Sargent went to Central Arizona Light & Power Co in 1946 as executive vice president. Later in the same year he became president. Under his direction the company has been expanding rapidly. Following a merger with Arizona Edison Co the name Arizona Public Service was adopted for the new company which now serves most of the state.

AD COPY THEMES

Alabama Power Co—"This Little Pig Stays Home" heads an ad pointing out that once upon a time nearly all the iron produced in Alabama went to the foundries of the North for processing. Now most of the metal is used in the South.

Kansas City Power & Light Co—"You can use your automatic blanket 3 nights for 5¢" is the copy for one of a series of ads telling how little it costs to operate appliances. The only other copy in the ad is the company name and "Electricity . . . Still your biggest bargain." Illustration is Reddy Kilowatt pointing to an electric blanket.

Montana Power Co—"Laboratory of a Culinary Engineer" is the head on an ad portraying a woman overlooking a modern electric kitchen. Copy reads, "Mom faces plenty of engineering problems every day in keeping your home running smoothly. You can give her a lift by providing fast, efficient electrical helpers in the kitchen." Then listed were the various electrical kitchen services.

WASHINGTON COMMENT

JESSE MOCK

"I don't know whether businessmen can still sell or not," Interior Secretary Douglas McKay said recently.

The genial, sometimes blunt, Oregon Chevrolet dealer then proceeded to give a bang-up demonstration of his own ability as a salesman. He has not lost his knack during his two terms as governor and his nearly two months in the Eisenhower administration

McKay Meets the Press and Gets a Welcome

McKay's audience was one of the toughest in the nation —several hundred hard-to-impress Washington news reporters. Before he had finished, he had them responding as if they were his own car salesmen back in Salem listening to an early morning pep talk by the boss.

True, McKay was the invited guest of the reporters at their own National Press Club, but this group of writers has never been accused of carrying politeness to the point of insincerity. They seldom bother to hide their boredom or to stifle a frown toward sham. It is not too much to say that the attention and generous applause which these several hundred reporters bestowed on McKay were genuine. His quick wit brought laughter at appropriate times and helped to dispel an old Democratic rumor that there is no sense of humor in the new Republican administration.

McKay Is a Salesman . . . As all successful salesmen must, McKay was selling himself first. But his main aim was to sell the newsmen on the new Republican administration, especially as it relates to his own Interior Department.

His methods were somewhat unusual, but evidently he had carefully keyed them to the temper and attitude of his audience. After 10 or 15 minutes of introductory remarks, he opened the floor to questions. The 30 or more questions put to him were answered frankly, often right to the point. There appeared to be much less dodging than newsmen have come to expect from men in public life.

His Views on Power . . . A sampling of McKay's replies gives an insight into his philosophy and at the same time gives a hint of his selling techniques. Take these answers dealing with electric power matters:

- Anytime an electric company comes to the Interior Department and asks for more than it rightfully deserves, it is just plain crazy. The better ones know that.
- The federal government should enter into construction of multi-purpose water projects on the basis of economic feasibility rather than on the basis of "pork barrel" politics.
- "There are no private utilities. They are privately owned public utilities."
- Private industry has done "a terrific job" developing hydroelectric projects on the tributaries of the Columbia River, but there are some main stem projects that private industry cannot tackle. These include such vast projects as Bonneville, Coulee, and Hungry Horse.
- "I believe the Truman budget for Interior can be cut." A staff is hard at work on it. More effort will be made to reduce it if Congress is tough.
- On the proposed St. Lawrence power project, "I think if New York wants to go ahead with its part of the power project, I say let it go to it."
- Ice Harbor project on the Columbia will be built. "As governor of Oregon, I approved it in principle."
- On federal construction of transmission lines, "I don't like duplication." Some plan should be feasible whereby government and private industry can cooperatively use lines which are built.
- On possible merger of the Bureau of Reclamation and Army Corps of Engineers, "It seems a little wasteful to me to have two agencies doing the same thing. But on the other hand, consolidation might result in an agency that is colossal."
- On his predecessor, Oscar L. Chapman, "I've found that you never make money knocking a competitor. Besides Oscar Chapman is an acquaintance of mine although we differ on our political philosophies."

McKay was the first of the Eisenhower cabinet members to face the Washington press corps on its own ground. It is too much to say that he won every man to his side. But he is assured of a sincere welcome anytime he cares to drop around again.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Added ground wires and reduced conductor height intensify the voltage gradient at the surface of transmission conductors and, therefore, the corona but radio noise in the vicinity is decreased.

Lightning arrester application to extra-high-voltage stations should recognize the possibility that lead lengths will prove considerably longer than for prevailing voltages; 2000 feet is not unlikely.

Watthour meters of today are so highly accurate that incessant testing of them means laying out dollars to catch elusive pennies.

Crushing of aluminum bus metal can occur if too large a bolt is used for a given thickness of the bolted joint. Remedy is a large washer to distribute the pressure.

Transformer oil fire may shut down a one-unit one-line plant and leave no power to drive the fire-pump. A turbine-driven pump could run on stored steam in the boiler.

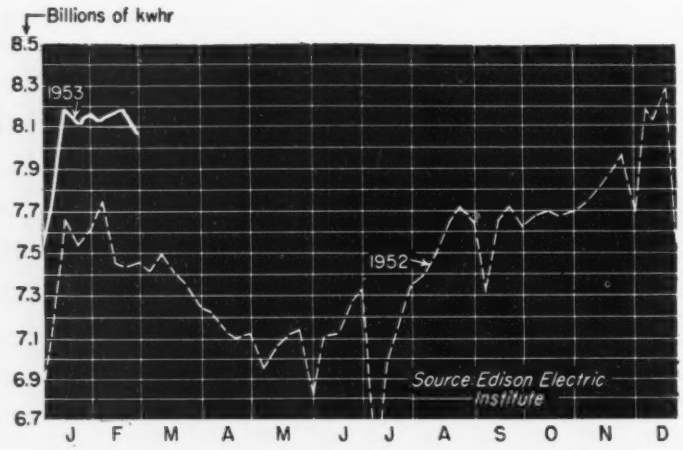
Coal will continue to burn as it moves away from the burner if it is not pulverized too fine. But fine pulverization is considered better for low volatile coal.

Motor-driven exciters can be counted on to give performance equivalent to that of a direct-connected exciter for any disturbance which does not knock the generator out of synchronism.

Circuit breakers not designed for switching capacitors may result in random restriking of arc under certain conditions and may further result in disruptive transient voltages.

Rain severe enough to cause corona and radio interference occurs a fraction of one percent of the time. Toleration of this infrequent disturbance would permit the economy of relatively small diameter conductor.

STATISTICS



Output Week Ended Feb. 28—8,069,760,000 Kwhr

Per Cent Change From Previous Year

	Total US	New Eng.	Mid. Atlan.	Cent. Ind.	West Cent.	South-east	South Cent.	Rocky Mount.	Pacific NW	Pacific SW
Feb. 28	+8.8	+5.4	+5.0	+10.8	+10.5	+11.6	+2.1	+10.2	+7.1	+12.3
Feb. 21	+9.9	+13.2	+7.3	+10.9	+10.3	+13.2	+3.7	+9.6	+5.4	+11.7
Feb. 14	+9.5	+8.7	+7.0	+10.6	+10.0	+14.0	+5.3	+9.2	+5.1	+9.4

Electric Power Statistics

		Latest Month	Preceding Month	Year Ago
Peak Load (Million Kw)	Dec.	75.5	72.8	70.4
Capacity (Million Kw)	Dec.	82.05	80.91	75.54
Production (Billion Kwhr)	Dec.	36.45	33.75	33.14
Hydro		8.22	6.52	9.13
Fuel		28.23	27.23	24.04
Fuel Consumption				
Coal (Million Tons)	Dec.	10.72	9.93	9.64
Oil (Million Barrels)		8.52	7.75	6.29
Gas (Billion Cu Ft)		60.54	69.94	52.43
Sales (Billion Kwhr)	Nov.	30.08	30.15	27.92
Residential		8.16	7.72	7.37
Commercial		5.01	5.09	4.70
Industrial		14.91	15.16	13.89
Other		2.01	2.17	1.97
Net Income Class A & B Companies ($ Million)	Nov.	79.81**	64.86**	69.92
Estimated Dec. '53 Peak (Million Kw)	Nov.	87.3	87.2	88.3
Kwhr per Residential Customer (12 Month Average)	Nov.	2,155	2,143	1,988
Revenue per Kwhr Residential Service (12 Month Average)	Nov.	2.77¢	2.77¢	2.82¢
Canadian Production (Billion Kwhr)	Dec.	5.54	5.22	5.11

Business Statistics

FRB Industrial Production Index†††	Jan.	233*	233	217
Gross National Product Annual Rate ($ Billion)	3rdQtr.	343.4	342.6	337.1
E. W. 5 Industry Production Index	Jan.	130.0*	129.8**	124.4
ENR Construction Cost Index††	Feb.	123.1	123.1	114.8
BLS Consumer's Price Index	Jan.	190.4	190.7	189.1
NEMA Insulation Materials Sales Index†	Dec.	655	579	466
NEMA Electric Appliance Sales Index†	Dec.	268	251	218
NEMA Household Refrig. Sales Index†	Dec.	147	152	115
Metal prices (March 4)				
Copper, Conn. V., lb		$ .27½-.32	.24½	.24½
Lead, N. Y., lb		.13	.13½	.19
Zinc, prime Western E. St. Louis, lb		.11¼	.11½	.19½
Tin, Straits, qual. N. Y. lb		1.21½	1.21½	1.21½
Aluminum, ingot, base price		.20½	.20	.19
Nickel, base price		.60	.56½	.56½
Steel, billets, Pitts., ton		59.00	59.00	56.00
Steel, scrap, No. 1 heavy, Pitts., ton		45.00	45.00	45.00

* Preliminary ** Revised † 1936=100 †† 1949=100 ††† Unadjusted

How Much Energy Do Manufacturers Purchase?

Millions of Kwhr

	1950	1947
Food and kindred products	10,827	8,427
Meats products	1,678	1,271
Dairy products	1,047	716
Canning, preserving, freezing	651	434
Grain mill products	1,877	1,565
Bakery products	868	675
Sugar	55	40
Confectionery products	419	294
Beverages	1,008	852
Miscellaneous food preparations	3,224	2,580
Tobacco manufactures	186	155
Textile mill products	10,715	8,288
Woolen and worsted	837	705
Yarn and thread mills except wool	1,812	1,441
Cotton and rayon broad-woven fabrics	6,072	4,815
Knitting mills	693	429
Carpets and rugs	290	200
Apparel and related products	*	837
Men's and boys' suits and coats	154	110
Men's and boys' furnishings	276	172
Children's outerwear	53	27
Miscellaneous apparel	57	36
Miscellaneous fabricated	244	208
Lumber and products (except furniture)**	2,841	1,503
Lumber and timber basic products	1,674	819
Wooden containers	170	151
Miscellaneous wood products	194	187
Furniture and fixtures	856	705
Household furniture	617	528
Office furniture	60	51
Screens, shades, and blinds	65	34
Paper and allied products	7,697	6,175
Pulp, paper, and paper board	6,466	5,411
Paperboard containers, boxes	364	316
Printing and publishing industries	1,738	1,251
Chemicals and allied products	16,001	11,963
Industrial inorganic chemicals	6,721	4,541
Industrial organic chemicals	4,988	4,369
Soap and related products	207	182
Paints and allied products	588	455
Fertilizers	278	271
Vegetable and animal oils	1,127	820
Miscellaneous chemicals	1,382	940
Petroleum and coal products	4,721	3,753
Coke and byproducts	714	606
Rubber products	3,008	2,650
Leather and leather products	592	475
Footwear (except rubber)	268	201
Handbags and small goods	13	14
Stone, clay, and glass products	7,715	5,865
Pressed and blown glassware	1,096	1,032
Structural clay products	779	453
Pottery and related products	225	159
Concrete and plaster products	994	628
Miscellaneous nonmetallic mineral products	1,109	798
Primary metal industries	38,818	31,428
Blast furnaces and steel mills	17,233	14,256
Iron and steel foundries	2,434	2,202
Primary nonferrous metals	14,308	11,329
Nonferrous rolling, drawing	2,325	1,880
Miscellaneous	1,904	1,316
Fabricated metal products	4,793	3,739
Cutlery, hand tools, hardware	640	511
Heating and plumbing	687	590
Structural metal products	975	785
Metal stamping and coating	1,091	816
Fabricated wire products	263	183
Miscellaneous	600	507
Machinery (except electrical)	6,034	5,401
Engines and turbines	354	289
Tractors and farm machinery	850	683
Construction and mining	594	594
Metalworking machinery	766	683
Special-industry machinery	548	537
General industrial machinery	723	740
Office and store machines	177	141
Service and household machines	1,058	896
Miscellaneous machinery parts	964	838
Electrical machinery	3,888	3,156
Electrical industrial apparatus	1,815	1,551
Miscellaneous	388	333
Transportation equipment	6,991	5,552
Aircraft and parts	1,527	1,043
Ships and boats	423	637
Railroad equipment	373	366
Instruments and related products	579	456
Medical instruments, supplies	102	82
Watches and clocks	57	40
Miscellaneous manufactures	1,568	1,043
Toys and sporting goods	193	134
Office supplies	58	43
Miscellaneous manufactures	346	290

Source: Bureau of the Census
* Withheld ** Not strictly comparable

FINANCIAL

Accounting Treatment of Accelerated Amortization by State Public Service Commissions

Georgia—Georgia Power Co 12/23/52

• Credits to income in the post-amortization period will be considered as earnings of the company for rate making purposes.

• There appears to be two conditions which should be prescribed. One is that the full amount of credits to the Reserve for Deferred Income Taxes should be credited back to income after the amortization period. The other condition is that the accounting for the deferred taxes should not be spread over an unusually long period of time. Some of the facilities certified have an estimated service life of over 70 years (hydro plants) and it does not seem wise to maintain the reserve for such an extended period of time. Moreover, the remaining balances during later years will become relatively insignificant due to the clearing of balances related to facilities of shorter life. This order will therefore stipulate such conditions.

• After careful consideration of this matter it is the opinion of the commission that the accounting treatment proposed should be prescribed.

• Wherefore, it is,

Ordered—(a) That the company shall account for property in respect of which said certificates of necessity are issued in the same manner as other property of the company and shall accrue depreciation of such facilities on its books at the normal rate of depreciation.

(b) That the company shall charge, during the period the amortization of emergency facilities results in reduction of income taxes to "Provision for Deferred Income Taxes" as a sub-account under account 507, Taxes, and shall credit to "Reserve for Deferred Income Taxes," an amount equal to the reduction in income taxes arising out of accelerated amortization in excess of normal depreciation allowable for income tax purposes.

(c) That the company shall charge, during the period the accelerated amortization of emergency facilities results in increased income taxes, to "Reserve for Deferred Income Taxes" until such reserve is exhausted and shall credit to "Current Income Taxes Deferred in Prior Years," a sub-account under account 507, Taxes, an amount equal to such increase in income taxes, except as modified below.

• **Ordered further** that the maximum period over which the reserve may be maintained is 30 years on each item from and including the year of first accelerated amortization claimed for income tax purposes, and that to accomplish this the credit to income in each year after the initial five year amortization period shall not be less than the amount necessary to maintain the cumulative income credits in the post-amortization period at not less than 4% per annum of the original aggregate balance for the number of years in which credits to income have been made.

For earlier accelerated amortization orders see Page 42, Oct. 13, 1952 and Page 77, Jan. 12, 1953 issues of Electrical World

• **Ordered further** that with each annual report to the commission Georgia Power Co shall file a statement showing for the accounting period in question and for each certificate of necessity the normal depreciation expense assignable thereto, the amortization claimed for tax purposes, the resulting tax deferment and the accounting for these tax deferments.

• **Ordered further** that the "Reserve for Deferred Income Taxes" shall be set forth as a separate reserve on all published balance sheets of the company with an appropriate note relative thereto explaining the source and ultimate disposition of the reserve balance.

• **Ordered further** that at no time shall all or any portion of the reserve balance be transferred to any surplus account of the company.

• **Ordered further** that in future rate proceedings before this commission whether they be on application of the company or on motion of the commission, claimed rate bases shall exclude amounts provided through the deferment of income taxes under Section 124-A of the Internal Revenue Code, unless otherwise ordered by the commission at that time.

• **Ordered further** that the commission retains jurisdiction of this proceeding for the purpose of issuing any further orders which seem meet and proper.

Kentucky—Kentucky Utilities Co 11/25/52

• The commission ordered that Kentucky Utilities Co, Inc, if it elects to avail itself of the provisions of Section 124A of the Internal Revenue Code, shall during the five-year period in which the accelerated depreciation or amortization is in effect charge to an account "Provision for Deferred Income Taxes" as a separate sub-account under Account 507—Taxes, with concurrent credit to "Surplus Arising from Deferment of Income Taxes" as a separate sub-account under Account 270—Capital Surplus, the amount of deferred income taxes arising each year from the special depreciation or amortization.

• **The PSC further ordered**, that after the amortization under each necessity certificate is completed and thereafter for a period of 28 1/3 years (340 months) which is the estimated remaining service life of the property for tax purposes, the company shall charge to "Surplus Arising from the Deferment of Income Taxes" with concurrent credit to "Portion of Current Income Taxes Deferred in Prior Years," a separate sub-account under Account 507—Taxes, an amount for each month equal to 1/340th of the surplus arising from each necessity certificate. These entries shall be made regardless of any revisions which may take place in the income tax laws.

• The commission further ordered that nothing contained herein shall be construed as a finding by the public service commission as to the reasonableness of the company's annual charges for depreciation.

Virginia—Virginia Electric & Power Co 11/26/52

• During any period of accelerated amortization of the portion of the costs of emergency facilities certified pursuant to said Section 124A of the Internal Revenue Code, the company must charge to "Provision for Future Federal Income Taxes" and concurrently credit "Earned Surplus Restricted for Future Federal Taxes on Income" amounts equal to the reduction in federal taxes on income resulting from the accelerated amortization of such facilities for federal income tax purposes.

• After the expiration of the effective amortization period and until "Earned Surplus Restricted for Future Federal Taxes on Income" applicable to specific facilities is exhausted, or such facilities are retired from service, the company must charge "Earned Surplus Restricted for Future Federal Taxes on Income" and credit "Current Federal Income Taxes Deferred in Prior Years" with amounts equal to the increase in federal taxes on income resulting from depreciation on the emergency facilities no longer being available for federal income tax purposes.

(Continued on next page)

New Jersey—Public Service E&G **1/16/53**

● The company shall account for property with respect to which such necessity certificates are issued in the same manner as other utility property of the company and shall accrue depreciation of such facilities on its books at the normal rates of depreciation.

● During the accelerated amortization period, the company shall include under operating revenue deductions, in account 507 Taxes, subaccount "Provision for Deferred Federal Taxes on Income," an amount equal to the reduction in federal taxes on income resulting from the accelerated amortization of emergency facilities; the amount so included to be credited to a subaccount under account 271 Earned Surplus, entitled "Earned Surplus Restricted for Future Federal Taxes on Income."

● After the end of the accelerated amortization period, the company shall credit annually to operating revenues deductions, account 507 Taxes, subaccount "Portion of Federal Taxes on Income Deferred in Prior Year," by appropriation from account 271 Earned Surplus, subaccount "Earned Surplus Restricted for Future Federal Taxes on Income," an amount equal to 1/25th of the aggregate tax reduction arising from accelerated amortization of emergency facilities, until such reduction is exhausted.

● The company shall incorporate in its annual report to the board a statement with respect to each necessity certificate, the amount of plant costs amortized, the resulting reduction in federal income taxes, the entries made in accordance with this order, the cost of plant retired which was included in such necessity certificate, and any other pertinent data or calculations concerning the accumulation or disposition of the account "Surplus Restricted for Future Federal Taxes on Income," which the commission may request.

● The authorization evidenced by this letter is confined to accounting procedure only. Therefore, the board retains jurisdiction of this matter and reserves the right to treat the matter otherwise in any proceeding wherein the accounting procedure herein directed may be concerned.

Washington—Pacific P&L **1/30/53**

The company will do the following:
● During the 60-month period of rapid amortization,

1. Income statements and net income transfers to earned surplus shall reflect actual federal tax on income liability which computes as applicable to net taxable income after the application of the tax benefit resulting from the accelerated amortization.

2. Federal taxes on income as stated actually on income statements shall be footnoted to reveal the estimated portion of tax deferment associated with the statement period due to the benefit of accelerated amortization.

3. Transfers to earned surplus shall be divided as follows:

a. That portion which is equivalent to the estimated deferment of federal tax on income due to accelerated amortization shall be credited to Account 271.1, "Earned Surplus — Restricted (Amount of Federal Income Taxes Deferred Due to Accelerated Amortization of Certain Facilities)."

b. That portion which remains shall be credited to Account 271, "Earned Surplus." The balance in Account 271.1 is restricted as to distribution for dividends and to any other distribution except as will be set forth hereinafter. Financial statements prepared by the company at any time a balance is reflected in Account 271.1 shall set forth this balance separately and shall footnote this account to read as indicated in Appendix A-II in the order.

● After the expiration of the 60-month rapid amortization period:

1. Income statements and transfers of net income to earned surplus shall reflect actual federal tax on income liability, which computes from the net taxable income having reflected therein no benefit from the fully amortized investment.

2. Federal taxes on income as reported actually for the statement period shall be footnoted as indicated in Appendix A-III and shall reveal the estimated amount of the deferred federal tax on income which is included within the statement, and which is an excess due to the earlier complete amortization of the depreciable investment.

3. Net income transfers to earned surplus shall be in total to Account 271. Further, an amount equal to 1/12 of 1/25 of the total balance accumulated in Account 271.1 at the expiration of the 60-month rapid amortization period shall be transferred each month to Account 271 until the total accumulation in Account 271.1 is exhausted. The footnote as set forth in Appendix A-II of the order shall be continued with all financial statements rendered until the balance in account 271.1 is exhausted.

● The company has entered into agreement with this commission, and has so stipulated as included in Appendix B, that for each of the 25 years following the expiration of the 60-month period of accelerated amortization, insofar as such years may be involved in any proceeding before the commission affecting the company's electric rates, the company will credit to its operating revenue deductions for federal income taxes as shown on its books of account, 1/25 of the total amount by which its federal income taxes were reduced by reason of such accelerated amortization.

West Virginia—Appalachian Electric Power Co **2/6/53**

The company is directed to:
● Provide on its books of account for depreciation of properties or facilities covered in whole or in part by necessity certificates at rates consistent with those for like property or facilities not covered in whole or in part by necessity certificates.

● During any period of accelerated amortization of the portion of the costs of emergency facilities certified pursuant to said Section 124A of the Internal Revenue Code, to provide currently by charge to current provision for federal taxes on income in operating expenses and concurrently credit "Earned Surplus Restricted for Future Federal Taxes on Income" amounts equal to the reduction in federal taxes on income resulting from the accelerated amortization of such facilities for federal income tax purposes.

● After the expiration of the effective amortization period and until "Earned Surplus Restricted for Future Federal Taxes on Income" applicable to specific facilities is exhausted, or such facilities are retired from service, charge "Earned Surplus Restricted for Future Federal Taxes in Income" and credit the current provision for federal taxes on income resulting from depreciation on the emergency facilities no longer being available for federal income tax purposes.

Tax Write-Offs

Pacific P&L receives PSC order on how to handle accelerated amortization

Pacific Power & Light Co has received an order from the Washington Public Service Commission on the way the company should handle accelerated amortization both in the financial statements and for rate making purposes. The method used by the PSC is probably fairer and more equitable to all parties than any issued up to the present time by any public utilities commission.

Part of this order is shown under "Accounting Treatment of Accelerated Amortization by State Public Service Commissions" above.

Accounting Treatment . . . The order sets out the accounting treatment as follows:

1. During the 60-month period of rapid amortization; and

2. After the expiration of the 60-month rapid amortization period.

A reading of the order shows that there is no equalization of income. The adjustment is entirely made at the surplus level.

The company will show two accounts in surplus on the balance sheet. One will be titled "Earned Surplus—Restricted" which will cover the amount of federal income taxes deferred due to accelerated amortiza-

tion of certain facilities. The balance which remains will be credited to "Earned Surplus" during the five years of amortization. In the subsequent post-amortization period the "Restricted" account will be charged annually with 1/25th of the total balance accumulated and earned surplus credited with a like amount until the total accumulation in the restricted surplus is exhausted.

Rate Making . . . For rate making purposes, equalization is achieved by charging income with the annual tax savings during the first five years. This will prevent an excessive rate of return by the company. By crediting income with 1/25th of the total accumulated tax deferral during the subsequent 25 years, it will ease the company of additional burden of federal income taxes.

It is believed that this order will not only protect the company, the rate payers but also the commission in that it prevents the stockholders from reaping a temporary windfall through the action of the tax deferral.

FINANCIAL BRIEFS

New York State Electric & Gas Co has sold 75,000 shares of 4.40% preferred stock, $100 par, to institutions. Company will sell $5 million in 3¾% sinking fund debentures to three institutions . . . **Southern Canada Power Co** will pay May 15 a common dividend of 45¢ a share as compared to 40¢ a share previously . . . **St. Joseph Light & Power Co** will pay March 23 a common stock dividend of 42¢ a share as compared to 40¢ in previous quarters . . . **Manicouagan Power Co** has sold privately $10 million 4¾% debentures due 1972 . . . **Securities and Exchange Commission** has approved liquidation plans of New England Public Service Co and Northern New England Co. U. S. District Court at Portland, Me., will hear the plan on March 25 . . . **Delaware Power & Light Co** gets a permit to begin work on third unit at Edge Moor plant . . . **Florida Power Corp** has received a 25-year franchise from City of St. Petersburg, Fla. . . . **Hartford Electric Light Co's** Pres Kenneth P. Applegate has told the New York Society of Security Analysts that the company expects to earn around $3.65 a common share in 1953 as against $2.81 in 1952.

Today in Utility Finance

YIELDS (%)

Quality	Bonds			Preferred Stocks			Common Stocks		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
DATE									
1953									
Feb. 26	**3.12**	**3.17**	**3.26**	**4.14**	**4.28**	**4.58**	**4.99**	**5.33**	**5.67**
Feb. 19	3.09	3.16	3.23	4.14	4.30	4.59	5.01	5.35	5.73
END OF QTR.									
4th 1952	2.99	3.03	3.14	4.06	4.22	4.59	4.98	5.33	5.62
3rd 1952	2.99	3.03	3.16	4.10	4.26	4.61	5.18	5.59	5.96
2nd 1952	2.95	3.00	3.09	4.05	4.31	4.60	5.38	5.85	6.42
1st 1952	2.95	2.99	3.13	4.11	4.29	4.66	5.35	6.03	6.47

Data: Reis & Chandler, Inc.

EARNINGS

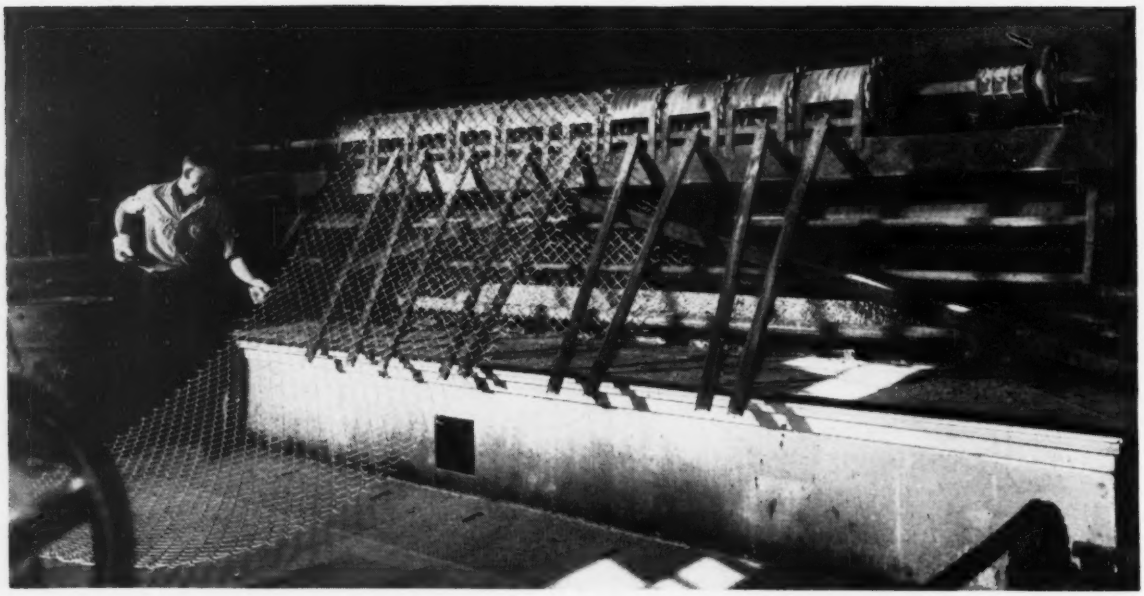
Company	Period Months	Ended	Net Income 1953	Net Income 1952	Earnings Per Common Share 1953	Earnings Per Common Share 1952
Alabama Power	12	Jan.	$11,670,336	$11,290,965	$....	$....
Arkansas Power & Light	12	Jan.	6,263,892(a)	4,763,921	....	....
California Oregon Power	12	Jan.	2,651,784	2,319,529	....	....
Detroit Edison	12	Jan.	17,651,192	15,452,992	1.73(b)	1.66(b)
Georgia Power	12	Jan.	12,193,165	9,766,375	....	....
Gulf Power	12	Jan.	1,823,980	1,251,822	....	....
Houston Lighting & Power	12	Jan.	9,011,374	7,055,260	....	....
Iowa Southern Utilities	12	Jan.	1,134,639	743,898	1.62(c)	1.21(c)
Louisiana Power & Light	12	Jan.	3,227,300(e)	2,524,727	....	....
Mississippi Power	12	Jan.	1,990,440	1,931,160	....	....
Mississippi Power & Light	12	Jan.	3,645,938(f)	3,115,614	....	....
Southern Canada Power	12	Jan.	468,721	373,026	....	....
Southern Co, consolidated	12	Jan.	20,515,312	17,513,152	1.20(i)	1.07(i)
Southern Indiana Gas & Electric	12	Jan.	1,906,883	1,717,992	2.18	1.91
			1952	**1951**	**1952**	**1951**
Consolidated Gas EL&P	12	Dec.	$10,139,982	$9,335,310	$1.81(g)	$1.69(g)
Florida Power Corp	12	Dec.	4,251,264	2,520,800	1.80(h)	1.29(h)
Hartford Electric Light	12	Dec.	2,681,542	2,712,314	2.81	2.97
Pennsylvania Water & Power	12	Dec.	1,326,698	1,229,086	2.31	2.54

Notes—Figures shown for the last four companies have been audited.
(a) Excludes $621,280 due to amortization of emergency facilities; (b) Based on 10,183,588 shares in 1953 and 9,302,503 shares in 1952; (c) Based on 589,911 shares in 1953 and 519,157 shares in 1952; (e) Excludes $297,976 due to amortization of emergency facilities; (f) Excludes $583,824 due to amortization of emergency facilities; (g) Based on average shares outstanding; (h) Based on shares outstanding at end of each year; and (i) Based on 17,082,230 shares in 1953 and 16,306,494 in 1952.

FINANCING

Company and Description	Amount of Offering (000)	Offering Price	Yield to Public
WEEK OF FEBRUARY 26—MARCH 4			
Bonds			
Indianapolis Power & Light—1st mtg 3⅝% due 1983	$10,000	$102.31	3.50%
Preferred Stock			
New England Power—80,140 sh $100 par $4.60 (being first offered to holders of outstanding 6% pfd on share-for-share basis from March 3 to March 23; unsubscribed shares to be sold by underwriters)	$8,014	$100.00	4.60%
SCHEDULE FOR MARCH—APRIL			**Bid Date**
Bonds			
Fall River Electric Light—1st mtg due 1983	$6,800	.....	March 9
Narragansett Electric—1st mtg due 1983	10,000	.....	March 10
Central Maine Power—1st general mtg due 1983	10,000	.....	March 10
Lake Superior District Power—1st mtg due 1983	2,000	.....	March 17
Public Service Co of Oklahoma—1st mtg	6,000	.....	March 17
Mississippi Power & Light—1st mtg due 1983	12,000	.....	March 17
Georgia Power—1st mtg due 1983	16,000	.....	March 24
Dallas Power & Light—1st mtg due 1983	9,000	.....	March 24
California Electric Power—1st mtg	8,000	.....	April 6
Florida Power & Light—1st mtg	15,000	.....	April 7
Kentucky Utilities—1st mtg	10,000	.....	April 7
Texas Electric Service—1st mtg	7,000	.....	April 13
New Orleans Public Service—1st mtg	6,000	.....	April 14
Preferred Stock			
Public Service Co of New Mexico—30,000 sh 4.85% $100 par	$3,000	.....	March 17**
Louisiana Power & Light—60,000 sh $100 par	6,000	.....	March 19
Georgia Power—100,000 sh no par	.....	.....	March 24
Texas Electric Service—100,000 sh $100 par	10,000	.....	April 13
Common Stock			
Lake Superior District Power—29,761 sh (being offered commonholders on 1-for-9 basis, record Feb. 25 to expire March 23)	.....	.....	March 7***
Central & South West Corp—606,084 sh (to be offered commonholders on 1-for-14 basis, record March 11)	.....	.....	.....
California Electric Power—136,249 sh	.....	.....	March 31
Arizona Public Service—378,000 sh	.....	.....	March 11#
Public Service Electric & Gas—750,000 sh	.....	.....	March 18##
Southern Indiana Gas & Electric—114,167 sh (to be offered to commonholders on 1-for-6 basis, record March 25 to expire April 10)	.....	.....	.....

Notes—* Estimated. ** To be offered by Allen & Co, underwriters. *** Offering date. # First Boston-Blyth & Co group, underwriters. ## Morgan Stanley & Co group will probably offer the stock.



NEW 280-KW GALVANIZING FURNACE at Anchor Post Products, Inc, coats continuous wire fencing. Stepless control of electric heat maintains uniform zinc temperature and applies uniform coating. Safety devices prevent production losses from furnace failures

Electric Heat Pays Off For

$40,000 investment is recovered in first year from savings in zinc, labor and overhead. Products receive a more uniform finish, and kettle failures are eliminated

JOHN S. CASE, Vice-president, Anchor Post Products, Inc, Baltimore, Maryland

G. H. HOFFMAN, Industrial Power Representative, Consolidated Gas, Electric Light & Power Co of Baltimore

In January 1949, after exhaustive economic studies, two electrically heated galvanizing kettles were installed at Anchor Post Products, Inc, to replace the existing oil-fired units. Tests conducted by the Consolidated Gas Electric Light & Power Co of Baltimore revealed sufficient savings in zinc, labor, and overhead to pay off the $40,000 investment in one year.

The electric kettles are 3½ ft deep, 3½ ft wide, and 13 ft long. Heat is supplied from nickel-chromium preformed elements suspended from refractory hooks along the sidewalls. Each unit is rated 280 kw, three-phase. Stepless control is provided by a saturable reactor device and a temperature recording regulator. A separate controller provides over-temperature protection to the heater chamber. A similar instrument acts as a safety device for excessive temperature in the zinc bath.

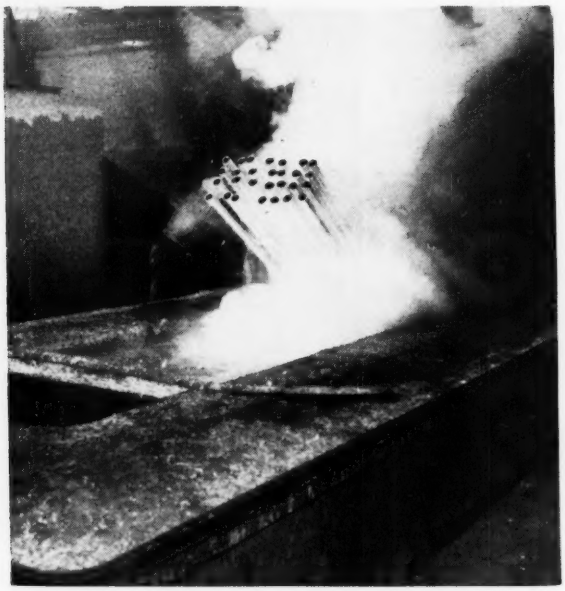
The temperature is held within 5F of the set point and varies less than 5F throughout the zinc bath. Production routine proceeds uninterrupted, supervisory headaches are eliminated, and safety controls virtually eliminate losses from overheating.

This is a marked improvement over the previous oil-fired kettles in which zinc temperatures varied up to 50F at the control point and 33F from point to point in the bath. The old kettles failed at two- to six-month intervals, spilling zinc into the combustion chamber where it solidified. Production was lost while new kettles were installed and brick work repaired.

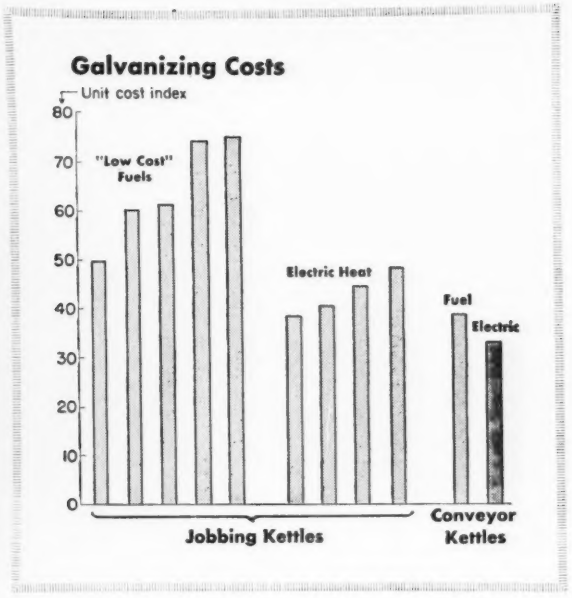
Despite the $1,000 per month for electricity to heat each kettle, compared with $640 for the oil-fired kettles replaced and below $400 for new kettles, savings in zinc and labor lowered the cost of galvanizing. The ambient temperature in the vicinity of the kettles is lower by 10 to 15F and noise from blowers and oil burners

About Anchor Post's Quality Control

Anchor Post Products, Inc, began making quality chain link fence over a half century ago. Its axiom is that a wire fence is no better than its galvanized (zinc) coating, and the company's success is proof of the axiom. The company's experience points out that important factors in producing top quality ware are the maintenance of constant and uniform temperatures in the zinc bath. For this purpose electrically heated baths were installed. By this process millions of pounds of fence material are galvanized each year to provide Anchor fences. On an undeviating policy of product quality, Anchor Post has grown so that today it has over $13 million in annual sales.



DIPPING FURNACE coats fence posts and other steel parts. This kettle was converted from oil firing to 280-kw electric heat



GALVANIZING COSTS per unit of production are lower with electric heating than with direct firing of so-called "low cost" fuels

Galvanizing

is eliminated. A smoother, more uniform finish is obtained on the products. And electric heat averages less than 8% of the galvanizing expense.

Anchor Post's selection of electric heating followed analysis of cost data supplied by a large hardware manufacturer which operates six galvanizing plants. The itemized costs are given in the table.

Compared production-wise, each electric installation showed a lower over-all galvanizing cost than its competitive fuel-fired installation by a margin of 32 to 41%, after adjusting for differences in unit costs of zinc and labor. The highest over-all electric cost was 16½% below the lowest equivalent cost for fuel-fired plants. The cost of electricity for these three electrically heated installations, and the two at Anchor Post, averaged 8.6% of the total galvanizing cost.

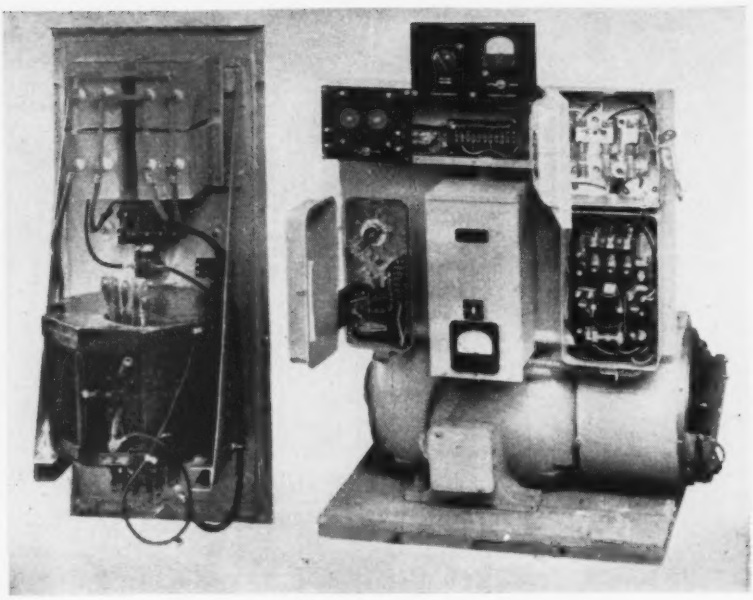
Consolidated Gas Electric Light & Power has conducted tests also at a jobbing operation in the Baltimore area where oil-fired galvanizing kettles are used. Cost data from these tests, together with those from the large hardware manufacturers and from Anchor Post, are compared in the accompanying graph. Nine of these cases are jobbing-type operations with conventional work-handling methods. Every electrically heated operation in this group produced galvanizing at a lower over-all cost than any fuel-fired installation. The other two cases are conveyorized galvanizing operation, and here also the electric kettle was more economical.

From the foregoing, two salient facts are revealed. First, the cost for heat in the galvanizing processes studied comprised only a small portion of the total galvanizing cost; spelter, labor, and overhead were the real expense items. Second, every electrically heated installation, of 11 cases studied, produced ware at a lower over-all cost than did any fuel-fired installation.

Average Monthly Operating Data On Galvanizing For 9 Months

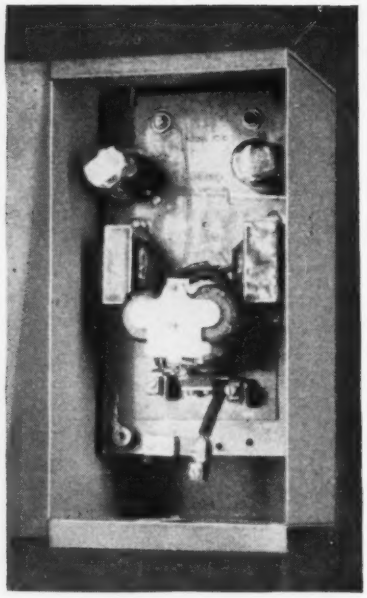
Item	Electric Kansas*	Fuel New York	Electric Pennsylvania	Fuel Alabama	Electric Canada	Fuel Wisconsin
Spelter-gross cost per cwt galvanized	$0.838	1.190	0.709	1.034	0.732	1.165
Dross recovered	0.139	0.215	0.154	0.142	0.077	0.118
Skimmings credit	—	0.003	—	0.026	0.006	0.004
Ash credit	—	—	0.003	0.014	—	0.002
Spelter Net	$0.699	0.971	0.552	0.852	0.650	1.041
Acids: Muriatic	0.008	0.023	0.001	—	0.001	0.0055
Sulphuric	0.049	0.075	0.057	0.054	0.030	0.020
Hydrofluric	—	0.011	0.001	0.002	0.008	0.0005
Flux	0.046	0.073	0.070	0.047	0.008	0.059
Fuel	0.334	0.179	0.138	0.096	0.078	0.091
Cleaner	0.018	0.013	0.030	0.006	0.005	0.015
Zinc Brightener	0.024	0.0075	0.001	0.010	—	0.0103
Miscellaneous: Lead	—	—	—	—	—	—
Acitrol	—	0.009	0.009	—	—	—
Glycerine	—	0.006	—	—	—	0.0014
Aluminum	—	—	0.001	—	—	—
Total Material Cost	**$1.178**	**1.382**	**0.859**	**1.065**	**0.780**	**1.244**
Direct Labor Cost	0.491	0.518	0.592	0.620	0.489	0.869
Indirect Cost Applied	0.354	1.19	0.487	1.323	0.979	1.612
Total Galvanizing Cost	**$2.023**	**3.09**	**1.938**	**3.008**	**2.248**	**3.725**
Price of zinc spelter per cwt, $	11.43	11.42	11.63	11.81	10.35	13.79
Pounds galvanized, average month	198,808	104,458	652,043	776,857	413,832	339,332
Pounds galvanized, per direct hour	365.0	184.57	297.94	217.17	213.2	136.76
Average labor rates, $/hr.	1.676	0.907	1.717	1.403	1.040	1.184
Overhead rates, $/hr.	1.20	2.41	2.20	2.80	2.11	2.20
Spelter consumption, pounds per ton galv.	146	208	122	175	142	169

* Figures for this plant are averages of the monthly data for 3 months only.



Coupling Device **Transmitter and Controls**

Centralized control transmitter uses 360-cycle, 2-kva generator driven by 60-cycle synchronous motor. The 360-cycle signal is superimposed on 3-phase distribution system



Receiver

Receiver at heater discriminates signal from 60-cps voltage to open or close circuit

Centralized Water Heater Control Reduces System Peaks

Cycling on and off feature at end of off period cuts billing demand and shortens necessary off period. Control scheme follows seasonal changes in peak load

H. A. SCHIMELPFENIG, Manager, Minnesota Valley Electric Cooperative, Jordan, Minn.

LINCOLN RIETOW, Application Engineer, Control Corporation, Minneapolis

Centralized water heater control at Montgomery Substation of Minnesota Valley Electric Cooperative provides material reduction in the 15-min demand. It disconnects the heaters during the peak, returns them to service afterward with automatic cycling until the system load is below peak value. Tests were run during the winter of 1951-52 to determine the benefits of such control to a typical REA system.

Montgomery Substation has 900-kva transformer capacity and serves 1,003 customers with 187 water heaters. Power is purchased wholesale on a rate which includes a 15-min, kw demand charge and is distributed over a 7.2/12.5-kv system.

Control Equipment . . . The transmitter consists of a three-phase, 3-hp reluctance type synchronous motor driving a 2-kva, single-phase, 360-cycle inductor generator. It feeds into a coupling coil inserted between the neutral point of the wye-connected transformer bank and the neutral of the distribution system. This transmitter is large enough for substations up to 2,500 kva.

A 360-cycle signal was chosen because its phase relationship with each of the three 60-cycle voltages of the three-phase distribution system is always the same. This phase relationship determines whether an "Off" or an "On" signal is transmitted. If addition to the voltage peak turns on the water heaters, then a subtraction will turn them off.

The transmitting equipment in the substation is built to respond automatically to load changes, rejecting the water heater load at some pre-set instantaneous kva value below the expected peak. The load must then drop to another pre-set value before it again accepts heaters. The differential between these two settings usually is determined from the previous month's load charts. If the load picked up exceeds the differential setting, the transmitter will cycle on and off at 7½ minute intervals. The average station load with cycling will be some value between the rejection and pick up settings.

The receiver consists of simple electronic device by which positive and negative half cycles of the house service voltage are balanced out in a discriminator. The signal voltage rectifies either positive or negative, depending upon whether transmission

was phased to add or subtract at the 60 cycle peak. Polarity of this rectified signal regulates an electronic amplifier to open or close a contactor in the water heater circuit.

Ampere demand is a simple control for the transmitter. As water heaters have unity power factor and substation voltage remains fairly constant, the change in ampere demand shows the load dropped and picked up.

Tests Determine Water Heater Load . . . Tests were made to determine the contribution of water heater load to system peak. For the monthly billing period starting Nov. 26, 1951 the heaters were operated with off-peak control for the first half of the month and without off-peak control for the second half. To measure the water heater load in the latter case, a control circuit dropped the water heaters for 40 seconds every 30 minutes. This off period was made short to have little effect upon the thermostatic switches. Comparison indicates that off peak control of water heaters reduced the circuit peak demand by upwards of 10%.

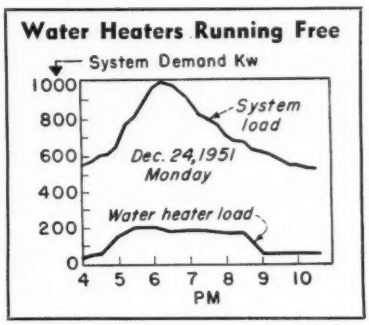
Average water heater load dropped was 124 kw, but their contribution to system peak was 163 kw or 31% more. The average load picked up after the peak control period was 286 kw.

Effect on Demand . . . Data from these tests show how much the water heaters contributed to the 15-minute billing demand. Dropping them before system peak and picking them up again after other load has dropped enough to avoid creating a new peak also is shown. Dropout and pickup were not synchronized with the demand meter; therefore neither causes a distinct jog in the curve.

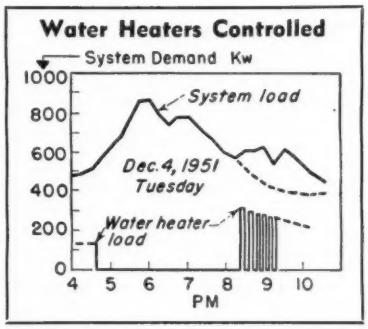
After the other load had passed peak, the heaters were picked up. The impact of picking up 300 kw exceeded the differential setting of the load control, thus indicating the possibility of establishing a new peak. Consequently the water heater load was dropped after an interval of 5 minutes. It was picked up for a second time 10 minutes later. This cycling was repeated until the differential setting of the load control was not exceeded and then no further cycling occurred. Subsequently the cycling was changed to 7½ minutes and 7½ off.

Tests Demonstrate Effect of Off Peak Control of Water Heaters

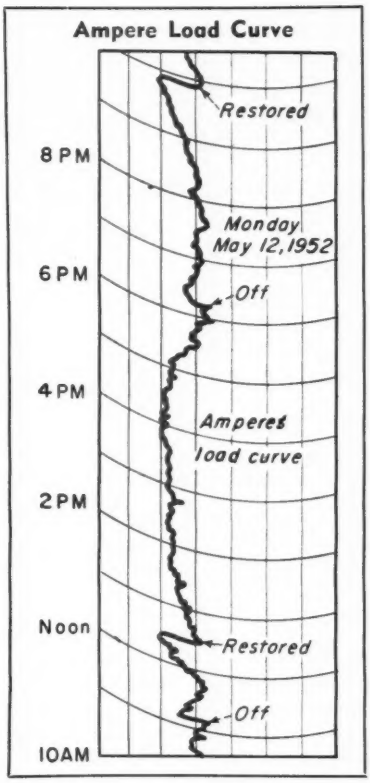
	Daily Peak Demand, Kw	Heater Load on Peak Kw	Heater Load Dropped, Kw	Peak Heater Load, Kw
Max Day without control	1030	200	...	200
Max Day with control	860	...	160	320
Reduction in Max Peak	170	...	...	...
15-Day Average without control	896	163	...	180
14-Day Average with control	809	...	124	286
Reduction in Peak	87	...	...	...



WATER HEATERS RAISE system demand, reaching a peak which is almost coincident with other system loads. Tests on December peak day shows this magnitude



CONTROL HOLDS water heaters off peak, automatically restoring service after peak period with cycling to avoid raising demand

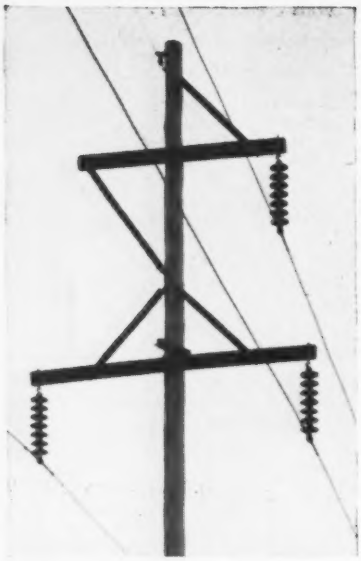


REDUCTION OF PEAKS shown on ammeter chart during noon and evening load periods of a typical May day

Maintenance Cost Low . . . The maintenance cost of this control equipment has been low. A survey of the original 120 receivers installed in 1947 shows that only 14 have required tube replacement.

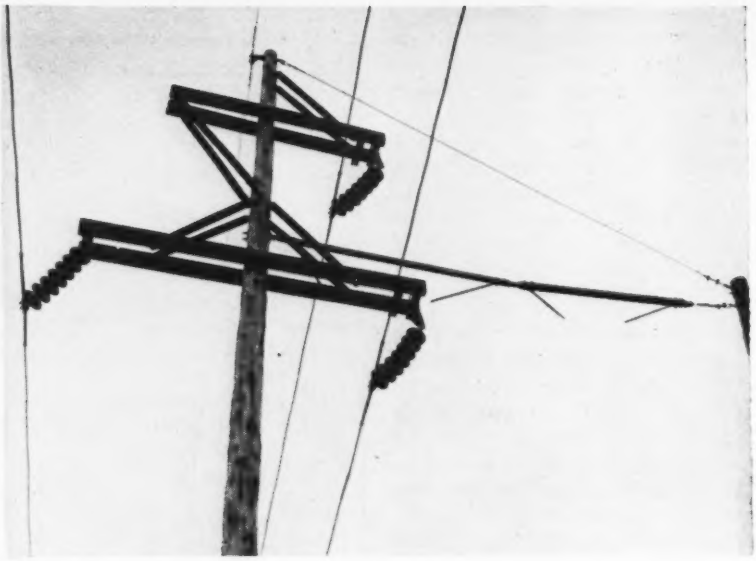
While any method for removing the water heater load at system peak should effect a savings in the demand charge, the centralized control method offers some additional features. It is flexible, and therefore variations in load from day to day and season to season do not pose a difficult control problem. A typical May day, for example, required a short off period at noon and a longer period in the evening to hold the demand down.

It also permits peak load gradual pick up of the water heater load after a power outage whether planned or accidental. When a power outage occurs all receivers drop automatically to the "Off" position. When power is reestablished, there is no initial water heater load. After an interval of several seconds part of the water heaters are picked up at a time. This reduces the large load to be picked up following an outage.



TANGENT STRUCTURE

Single pole supports 138-kv circuit with one shield wire and suspended down lead



SMALL ANGLE STRUCTURE

Double arms and offset brackets support conductors on small angles. Wood strain insulators in the lower guy maintain the high impulse level inherent in wood structures

New 138-kv Transmission Line

Design follows 46-kv pattern but provides more strength, greater clearances, and higher impulse level. Performance approximates H-frame construction at much lower cost

W. C. SCHMIDT, General Supervisor of Electric Construction

C. E. WAITS, Overhead Line Engineer, Consumers Powers Company, Jackson, Michigan

Continued load growth in the Consumers Power Co service area has produced a need in certain locations for a subtransmission system having greater capability than the present 46-kv high-voltage distribution system. Consideration was given to a 69-kv system. But while such a voltage would be suitable for low-cost, single-wood-pole construction, it would only double the 46-kv capability and, in this particular case, would also introduce a new voltage on the system.

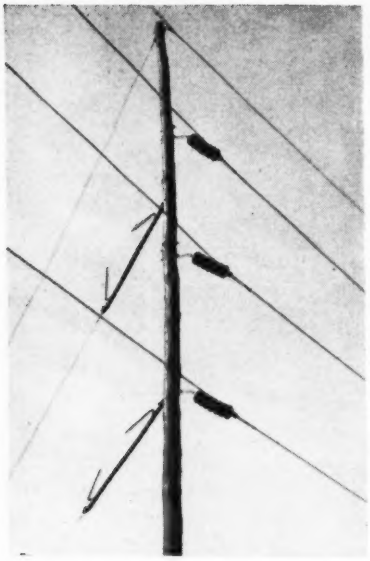
Another possibility was extension of the present 138-kv system to supply relatively small 138-kv substations. Investigation showed that this scheme possessed advantages that dictated its adoption. Accordingly a low-cost single-wood-pole construction suitable for operation at 138-kv was developed.

Conductors and Ground Wire . . . Conductors selected were 266,800 cir mil ACSR #26 A1/7 steel. Radio influence was the predominant factor in choosing conductor size although other factors influenced the final decision. This conductor has an outside diameter of about ⅝ in. (0.642 in.), a favorable contour as far as corona is concerned and an ultimate strength of 11,250 lb, permitting rather small

Table I—Summary of Sag & Tension Data

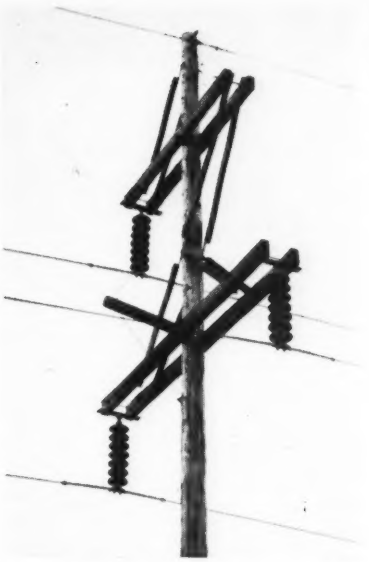
Loading			Final Sags & Tensions				Initial Sags & Tensions			
			266,800 circ mil ACSR 26/7		5/16-in. Steel		266,800 circ mil ACSR 26/7		5/16-in. Steel	
Temp Deg F	Ice In.	Wind lb/sq ft	Sag ft	Tension lb	Sag ft	Tension lb	Sag ft	Tension lb	Sag ft	Tension lb
0	1/2	*8	10.7	5,000	12.5	3,105	—	—	—	—
32	1/2	0	10.2	3,730	10.4	2,290	—	—	—	—
120	0	0	10.2	1,275	7.0	855	8.1	1,555	5.5	1,095
90	0	0	8.7	1,465	6.1	975	6.9	1,865	4.8	1,240
60	0	0	7.5	1,735	5.3	1,125	5.7	2,240	4.2	1,425
32	0	0	6.2	2,065	4.7	1,275	4.7	2,665	3.7	1,600
0	0	0	4.9	2,630	4.1	1,470	4.0	3,250	3.3	1,790
−20	0	0	4.2	3,055	—	—	3.5	3,585	3.1	1,925
60	0	4	7.8	1,920	—	—	6.6	2,265	—	—

* 1/2 in. ice + 4 lb wind + 0.29 for 5/16-in. steel strand



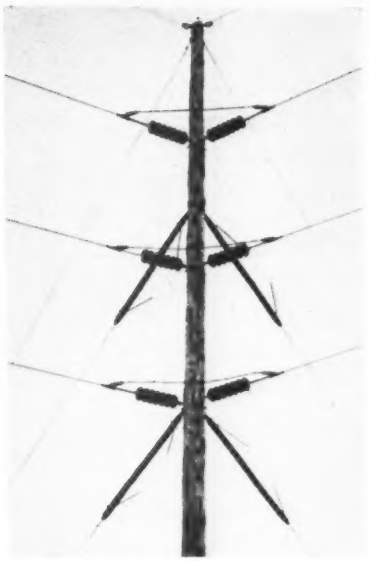
ANGLE STRUCTURE

Greater angles go vertical. Insulator brackets are omitted where the clearance permits



CROSSING STRUCTURE

Double arms support railroad crossings. Dead-end insulators can be added if needed



DEAD-END STRUCTURE

Vertical construction supports circuit dead-ends and sharp angles in the line

Uses Single-Pole Structures

sags with tensions well within permissible limitations. Using a maximum tension under heavy loading conditions of 5,000 lb in a 530-ft ruling span, the maximum tension is 45% of ultimate strength, the 60F final tension is 15%, and the 60F initial tension is 20% of ultimate. Since aluminum armor rods are used at all suspension points and either Stockbridge dampers or aluminum alloy strain clamps at dead end points, the possibility of fatigue trouble is remote.

The ground wire is $\frac{7}{16}$-in. (3 strands of 0.145 in.) steel strand with a Class C zinc coating. The ultimate strength of this strand—6,500 lb—is high enough to allow unloaded sags slightly less than those in the conductor without exceeding tolerable tensions. Ground wire is protected at all suspension points with galvanized steel armor rods.

Table 1 gives the sag and tension characteristics of the conductor and ground wire.

Primary insulation consists of seven 5¾ in. by 10 in. suspension insulators per string—11,000 lb M & E. This provides 60-cycle insulation as shown in Table II.

Details of Structures . . . Five different types of structures were designed to cover the range of line deflections. They are:

Tangent Structure
Light Angle Structure
Medium Angle Structure
Heavy Angle Structure
Dead End Structure

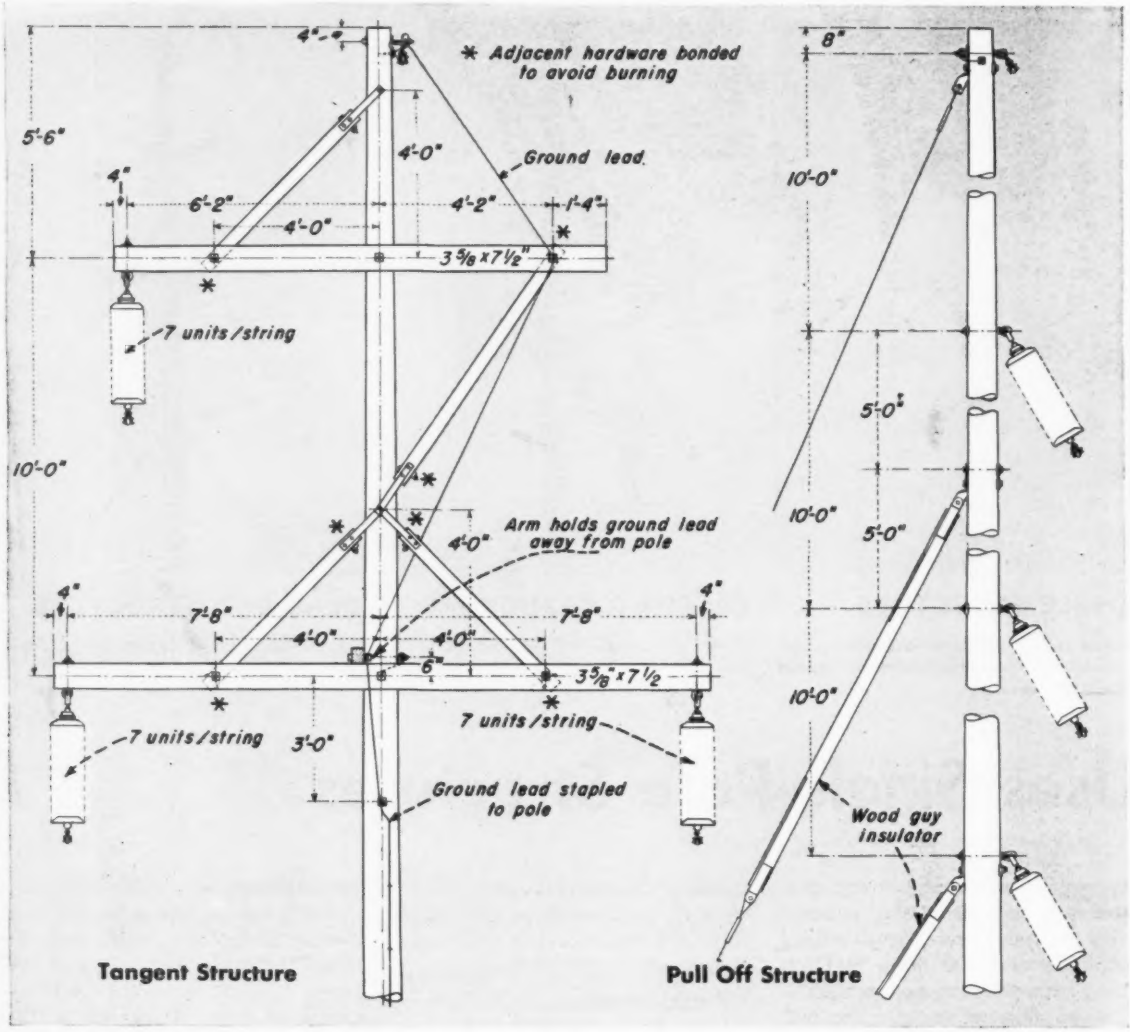
In addition it became desirable to provide a structure for railroad and telephone crossings and a dead end structure to eliminate uplift at low points in the terrain. Structures are designed for a maximum span of 550 ft but an effort was made to keep the spans down to about 500 ft in order to avoid potential trouble from "galloping" conductors. Where spans over 550 ft were necessary, standard H-frame structures were used.

Table II—60-Cycle Insulation Values

Dry Arcing Distance	42¼ in.
Leakage Distance	82¼ in.
Dry Flashover	435 kv
Wet Flashover	295 kv
Striking Distance Equivalent to Wet Flashover	34 in.

Tangent Structure . . . Configuration of the tangent structure follows that used for 23- to 46-kv single-wood pole lines. The lower arm is 3⅝ in. by 7½ in. by 16 ft, symmetrical with respect to the pole. The top arm is 3⅝-in. by 7½ in. by 12 ft, mounted offset so as to provide a 1½ ft offset between the top conductor and the conductor below it. Wood braces of 1⅝ in. by 3⅝ in. section with steel strap end fittings are used, three of the braces being identical and the fourth brace somewhat longer. Cross bolts are used in the brace wood sections and all bolts with less than 9 in. of clear wood between them are bonded in order to improve the radio influence characteristics.

In general ⅝-in. line hardware bolts are used throughout the structure but at three points bolts are ¾ in. These points are the attachment of the top and bottom crossarm to the pole and the intersection of three braces with the pole. The ¾-in. bolts are installed with the head of the bolt against the crossarm or brace, eliminating bending on the threaded portion and reducing the possibility of fatigue failures of these critical bolts.



POLE-TOP DRAWINGS SHOW CLEARANCES of cross-arm and vertical construction. Overhead shield wire is grounded at every structure, using anchor guys where available. Grounds are separated from insulator attachments to retain impulse strength of wood

Structure clearances are balanced under both static and wind conditions so as to provide a rather high impulse insulation level. Table III gives the values of the different insulation paths under impulse conditions.

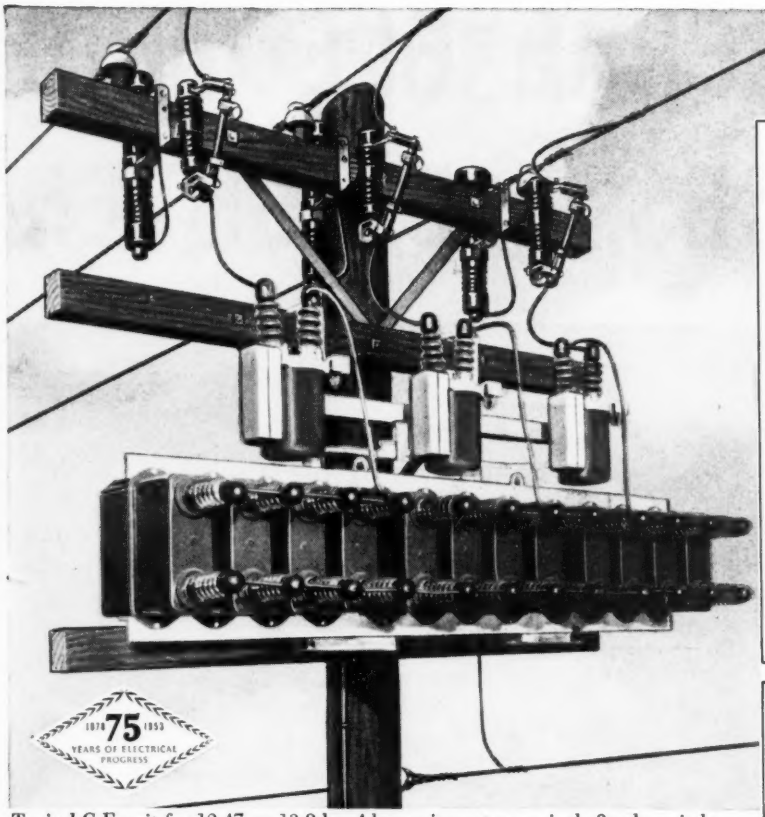
Angle Structures . . . Angle structures are in general single guyed wood poles with the conductors attached directly to the pole or to a swinging bracket. The poles are guyed at three points with the top guy being attached at the ground wire position and grounded at the anchor end. The lower two guys are each equipped with a wood guy insulator having a 9-ft wood path.

For light angles where the conductor tension is insufficient to hold the insulator string away from the pole, guyed crossarm construction is used. Single wood poles with double crossarms are provided and stub poles are necessary in order to guy the structures adequately without reducing the insulation level.

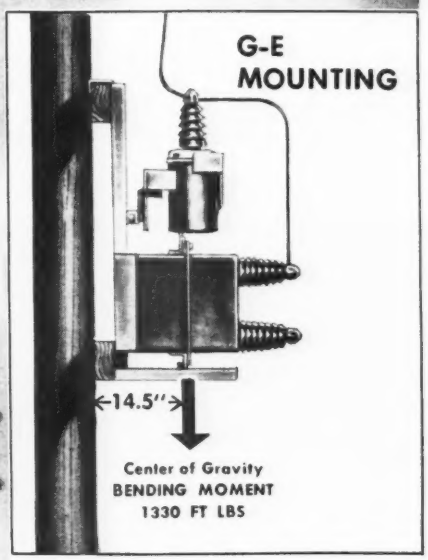
Experience . . . Consumers Power Co has at the present time about 200 miles of this construction in service, one half at 138 kv and the balance temporarily at lower voltages. The 100 miles of line in service at 138 kv has had a very good service record after one complete year. This new construction has proved to be very satisfactory. Its performance closely approaches that of the commonly used H-frame and the savings in first cost over H-frame construction are very attractive.

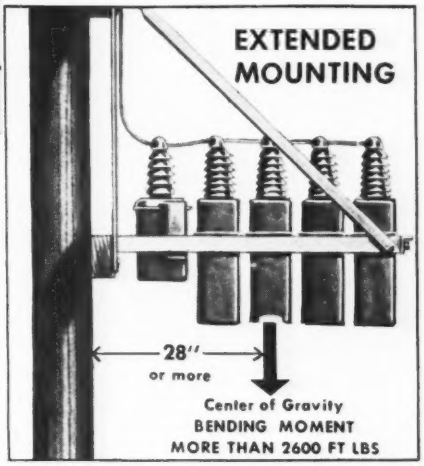
TABLE III Impulse Insulation

	Insulation Path			Moisture Condition	Swing Condition	Impulse Insulation Positive	
	Porcelain	Wood	Air			Critical	2 MS
Top Phase to Grd. Wire	7 Units	7 ft, 7 in.	———	Wet	Static	895 kv	1,390 kv
Top Phase to Grd. Lead	7 Units	10 ft, 4 in.	———	Wet	Static	1,120 kv	1,630 kv
Bottom Phase to Grd. Lead	7 Units	10 ft, 0 in.	———	Wet	Static	1,090 kv	1,650 kv
Bottom Phase to Grd. Lead	———	———	7 ft, 8 in.	Wet	Static	1,400 kv	2,000 kv
Bottom Phase to Grd. Lead	———	———	4 ft, 8 in.	Wet	4-lb wind	880 kv	1,440 kv



Typical G-E unit for 12.47 or 13.8 kv. 4-kv equipment uses single 3-pole switch.





LESS OVERHANG. Exclusive side mounting of G-E capacitors brings center of gravity almost 50% closer to pole, reduces bending moment, puts less strain on crossarms and poles.

G-E auto-switch equipment puts less strain and weight on pole

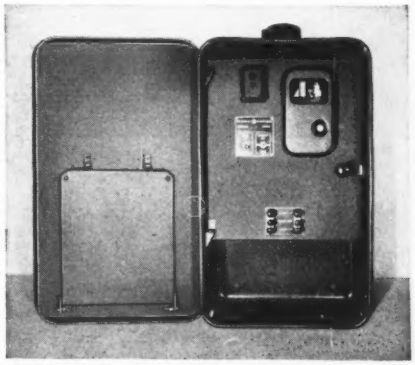
Side mounting of capacitors in General Electric auto-switch equipment brings the center of gravity of the equipment almost 50% closer to the pole than extended mounting. There's less strain on crossarms and poles. And because G-E capacitors are up to 25% lighter, the total weight on the pole is considerably reduced.

Neater, more compact design. G-E auto-switch capacitors—completely assembled, wired, and tested at the factory—arrive ready to install. All you do is hoist, bolt, and connect. Side mounting eliminates guy wires and extra braces—provides a neater, more compact appearance. Inspection and servicing are simplified.

Voltage regulating relay, the same as used in G-E regulator control to provide Class I accuracy, assures reliable control regardless of temperature or weather changes. Voltage and/or current-sensitive automatic controls are available. Controls, enclosed in separate weathertight housing for mounting at the base of the pole, are easy to inspect.

Available in 225 and 300-kvar ratings, from 2400 to 13,800 volts, this compact auto-switch equipment costs you no more. Get in touch with your nearest G-E Apparatus Sales Office for more information. General Electric Co., Schenectady 5, New York. 407-40

GENERAL ELECTRIC



ACCURATE CONTROL with famed voltage regulating relay. Weathertight housing mounts separately—permits easy inspection.

NEW GENERAL ELECTRIC INTRODUCES A BRIGHTER

FIRST INSTALLATION of new Form 206 luminaires was made in December, 1952, by Dayton Power and Light Company, at Oakwood, Ohio. A total of 52 Form 206 luminaires light the city's main business street.

You can put your confidence in—

GENERAL ELECTRIC

FLUORESCENT LUMINAIRE BROADER LIGHT PATTERN

Form 206 Maintains High Light Output Regardless of Temperature Changes

Now General Electric Engineers have made possible the finest whiteways in the world with the development of the new Form 206 Fluorescent Luminaire. Its high light output is held constant throughout a broad range of temperature, maintaining the lighting effectiveness in any weather conditions and throughout all hours of the night. The new six-foot "Rapid Start" G-E fluorescent lamps are designed specifically for outdoor operation. They require no starters, have no starting flicker, and light within a second after being turned on. With its broad, bright light pattern, particularly effective on wet pavements, the Form 206 Fluorescent Luminaire sets an entirely new standard of modern street lighting.

NEW, EASY INSTALLATION. Designed for speed, simplicity, and economy of installation, the Form 206's bracket is an integral part of the fixture. There are no guys, trusses, or supports. The entire unit, including bracket, weighs about 100 pounds, and is less than seven feet long.

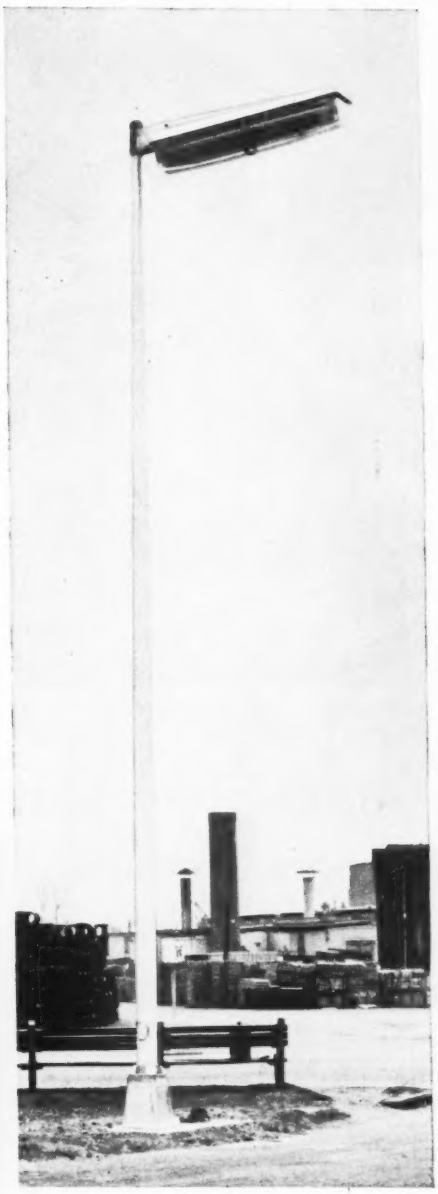
NEW MODERN APPEARANCE. Because all wiring can be internal, appearance of the new Form 206 can be free of unsightly wire loops. The Form 206 Luminaire can house its ballast, eliminating pole mounting. Natural aluminum housing and clear plastic globe in sleek, clean design make a dramatic, modern addition to any city's main business streets.

NEW ECONOMICAL MAINTENANCE is assured with lamps rated 7500 hours for long, economical service, and the elimination of starters. A completely enclosing plastic globe minimizes the effect of water, dust and dirt. Hinged at one end, it swings down and remains in position for fast easy servicing, when necessary.

FOR MORE INFORMATION contact your nearest General Electric Sales Office or write for Bulletin GEC-963, Section 452-133, General Electric Co., Schenectady 5, New York.

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

LOW MAINTENANCE COSTS are assured by features designed for rapid, easy servicing. Plastic globe, conveniently hinged, swings down for easy access by workmen. Maintenance costs are also reduced by this enclosing globe which minimizes water, dust and dirt problems. Luminaire is less than seven feet long.



FORM 206 LUMINAIRE is shown mounted on G-E aluminum pole. Sleek luminaire design combined with internal wiring and elimination of external ballast adds beauty to city streets.

BUBBLES OF COMPRESSED AIR prevent formation of sheet ice, maintain an open channel to direct ice breakup and discharge it through the gates at the selected location

Air Bubbler System Maintains Open Channel in Ice Sheet

P. M. HESS, Asst Supt of Operation, Pennsylvania Water & Power Co, Lancaster, Pa.

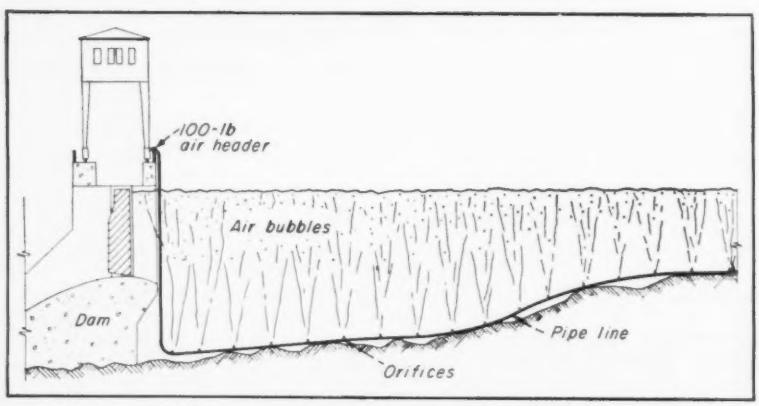
Use of an air bubbler system has for many years prevented the formation of sheet ice, even in zero weather, in front of the gates and on both sides of the skimmer wall at the Safe Harbor hydroelectric plant. The advantage of the system is that its operation is not dependent upon weather conditions such as snow cover, rough or smooth ice formation, which are detrimental to the effectiveness of some of the other systems such as heat absorbing and chemically acting materials—cinders, salt, carbon, etc. This air bubbler system principle was extended in the winter of 1949-1950 to maintain an open channel in the sheet ice upstream from the dam to assist in directing the break-up of the ice and the subsequent discharge of it through selected gates.

The initial installation for this experiment consisted of a 1,000-ft length of 1.5-in. and 1-in. galvanized steel pipe laid on the bottom of the pond (approximately 50 ft deep at the dam). Graded orifices, varying in drill size from No. 35 to 38, were placed every 20 ft on the pipe.

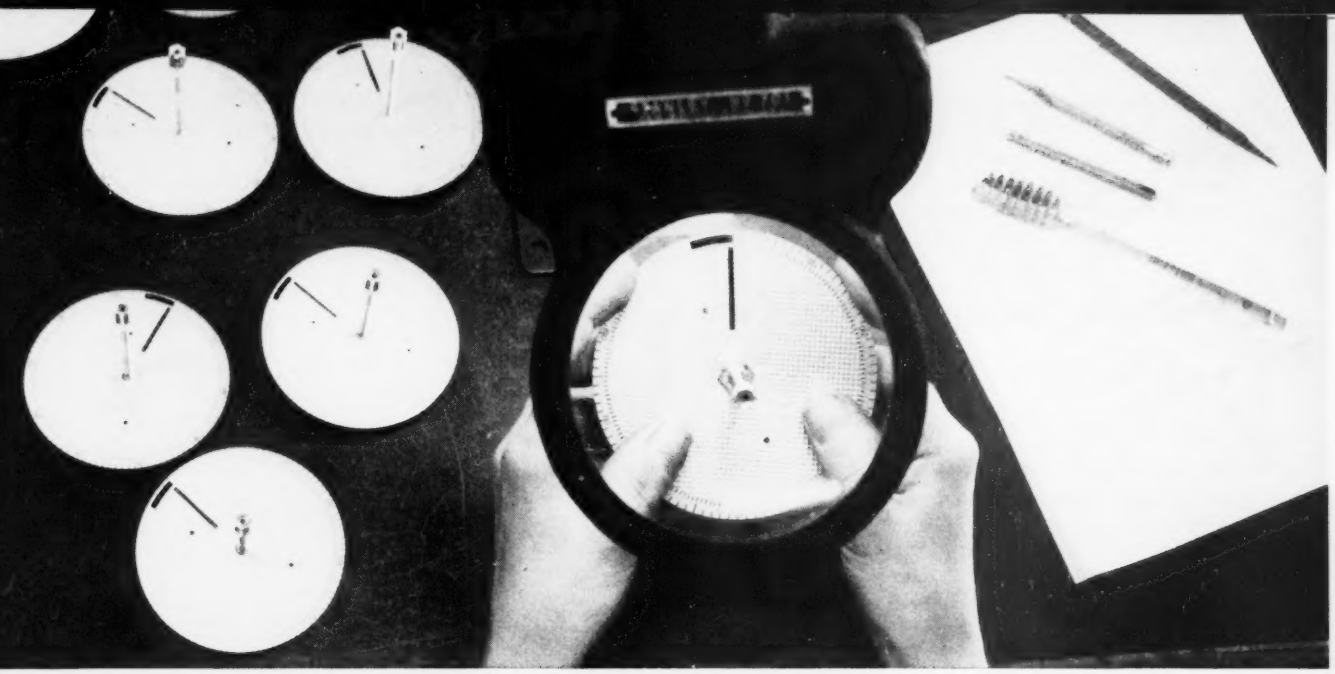
This pipe was connected through a 2-in. rubber hose to a compressed air system. Air is supplied from a 100-lb air header and the quantity is regulated by selecting the proper size orifice plate which will pass just enough air to supply all openings. For this installation a 9/32-in. orifice in the supply header was sufficiently large.

Approximately 200 cfm of free air was required to supply the demand. A by-pass is provided around the orifice plate to admit full pressure to the system periodically to free any clogged orifices. No clogging of orifices have been experienced since the initial installation.

Since the first installation in 1949-1950 winter, extensions and branches have been added. Ultimate plan considered the use of flexible metallic or plastic hose or tubing that can be installed each autumn before ice forms on the pond and removed in the spring after the ice has disappeared to prevent silting in the pipe. Later tests and experience proved the galvanized pipe to be better and silting in has not interfered with its effectiveness; there-



AIR BUBBLER SYSTEM is supplied from 100-lb air header and control orifice. Galvanized pipe is laid on river bottom and has graded orifices in drill sizes No. 35 to 38 every 20 ft of pipe



Revolutionary design, plus rigid quality control, gives assurance that . . .

Magnetic Suspension System of I-50 Meter Eliminates Need for Bearing Replacement

Magnetic suspension of the rotor in General Electric's I-50 watthour meter continues to prove its ability to eliminate bearing maintenance.

First, by life tests on bearing systems. For example, in one series of such tests, the systems were subjected to 142,000,000 revolutions at 79 times normal side thrust—equal to ***115 years*** of normal meter service. *No wear* could be measured on the graphite guide bushings.

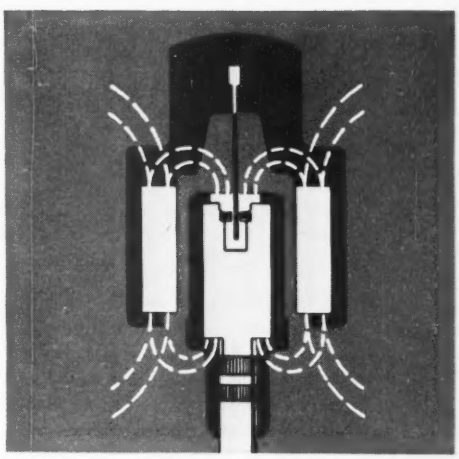
Second, by life tests on complete meters. Carried on for more than ten years, these tests continue to show excellent stability of meter calibration—proving that bearing friction remains unchanged.

RESULT: All bearing maintenance is eliminated. The cost of replacing bearings can be saved. The magnetic-suspension system is undoubtedly the only system that offers this service-free performance . . . and the resulting dollar savings.

FOR MORE INFORMATION on the G-E certified I-50 watthour meter, see the color movie, "Accent on Accuracy." Call your nearest G-E representative or write General Electric Co., Section 601-96, Schenectady 5, N. Y.

You can put your confidence in—

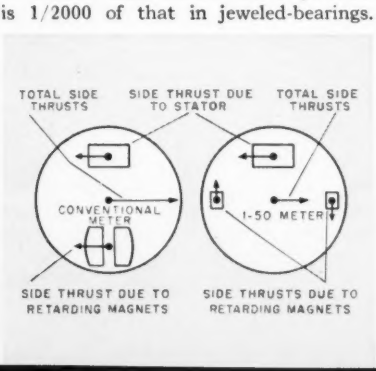
GENERAL ELECTRIC



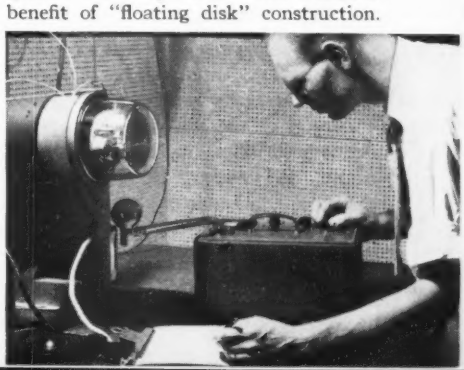
MAGNETIC SUSPENSION eliminates all vertical bearing pressures. Alignment is provided by resilient steel guide pins.

ROTOR is accurately set with this projection equipment. Stable suspension magnets maintain this high accuracy.

RETARDING MAGNETS are positioned to reduce side thrust. Total pressure is 1/2000 of that in jeweled-bearings.



NOISE TESTS prove that the I-50 is quieter than any other meter—another benefit of "floating disk" construction.



fore its removal annually is not necessary.

If with further experience with widely varying conditions the effectiveness of this scheme is confirmed, consideration will be given to extending the system with a view of maintaining an open channel in the deep water area of the pond. With such an open area, the movement of the pack ice might then be directed by way of the channel to the open crest gates on the dam, where it could be discharged over the dam, this preventing its accumulation.

Multiple Purpose Crane Cuts Costs 75%

C. J. SLAUSON, Iowa Electric Light and Power Co, Cedar Rapids, Iowa

Unloading and loading materials to and from freight cars and truck vans, transporting piping and heavy materials from outside storage buildings and shuttling tools to and from opposite sides of buildings and substations are just a few of the many jobs for which the new Carrying Crane has been used by the Iowa Electric Light and Power Co. Other uses include: handling 3,000 lb chlorine drums, removal of heavy debris from cooling water ponds, repair of overhead and underground ash piping, cleaning of snow by attaching a home made snow plow blade to the front of the crane, loading of trash accumulations into trucks, and all types of maintenance work where heavy lifting is involved.

Capacity of the crane is 4,000 to 10,000 lb. Cost is less than an overhead tram rail and hoist originally considered for the essential loading and unloading operations. Flexibility of the crane makes it available for many other jobs. Cost of doing the jobs has been reduced as much as 75%.

CRANE used for lifting and carrying fills the bill on many jobs and cuts costs up to 75%

Install Control Cable Ducts 64 at a Time

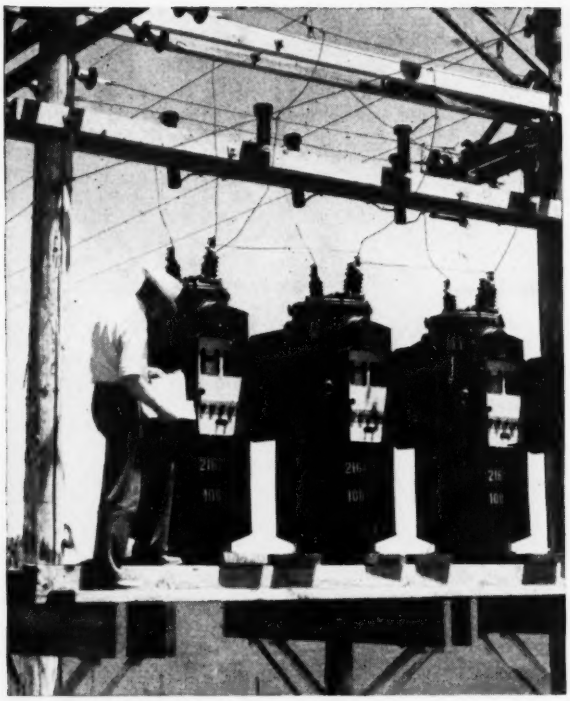
S. J. WARD, Superintendent of Substation Construction, Houston Lighting and Power Co, Houston, Texas

Pre-cast spacers and a form for holding ends together while handling has greatly reduced the cost of installing control cable ducts. Concrete spacers are poured and duct banks are assembled in the construction headquarters yard. Banks consisting of as many as 64 ducts have been assembled in this manner by Houston Lighting & Power Co.

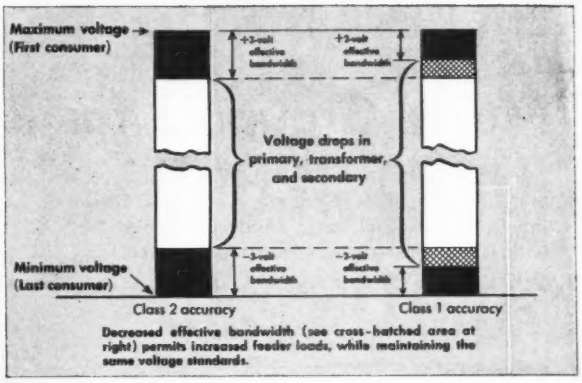
Greatest advantage lies in the elimination of caving in the trench. This is possible because the trench is dug, the duct bank placed in position with a crane and concrete is poured before the trench has time to cave. This also eliminates forms and bracing.

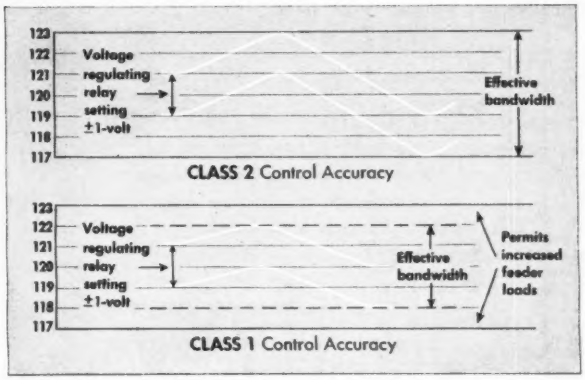
Forms on the end are held in place by four guy wires that are run through the corner ducts. These wires are fitted at the ends with a standard winch line fitting.

DUCT SECTIONS are pre-assembled and ready to go into position as soon as trench is opened. They are lowered to position with a crane. Here the crew guides section into position



GENERAL ELECTRIC TYPE ML32 voltage regulators provide better regulation on this branch line.


Maximum voltage
(First consumer)
+2-volt effective bandwidth
+2-volt effective bandwidth
Voltage drops in primary, transformer, and secondary
Minimum voltage
(Last consumer)
-2-volt effective bandwidth
-2-volt effective bandwidth
Class 2 accuracy
Class 1 accuracy
Decreased effective bandwidth (see cross-hatched area at right) permits increased feeder loads, while maintaining the same voltage standards.



Smaller effective bandwidth of voltage regulators permits increased feeder load-carrying ability

Class 1 accuracy controls of all G-E liquid-immersed feeder voltage regulators are important factor in reducing effective bandwidth

Voltage limits actually held at the output terminals of a feeder voltage regulator are referred to as effective bandwidth. One reason the effective bandwidth may exceed the bandwidth setting of the voltage regulating relay is the effect of control accuracy. Changes in temperature and frequency and errors in the potential transformer, current supply, or line-drop compensator elements act to increase the effective bandwidth of a regulator above the relay setting.

Hence, control accuracy is the key to reducing the effective bandwidth and, thus, increasing the load-carrying ability of a feeder.

The diagrams show how a reduction in effective bandwidth permits either lengthening a feeder to pick up more load or increasing the load over the existing line, while maintaining the same voltage standards for first and last consumers.

All G-E regulators, feeder- and station-type, are furnished with Class 1 accuracy controls as standard. Reducing effective bandwidth is important to you because of the obvious advantages of increased loadings or longer feeders. For full details on what Class 1 control accuracy of G-E regulators can mean to your system, contact your nearest G-E sales office, agent or distributor, or write for bulletin GEA-5690 to General Electric Company, Section 423-3, Schenectady 5, New York.

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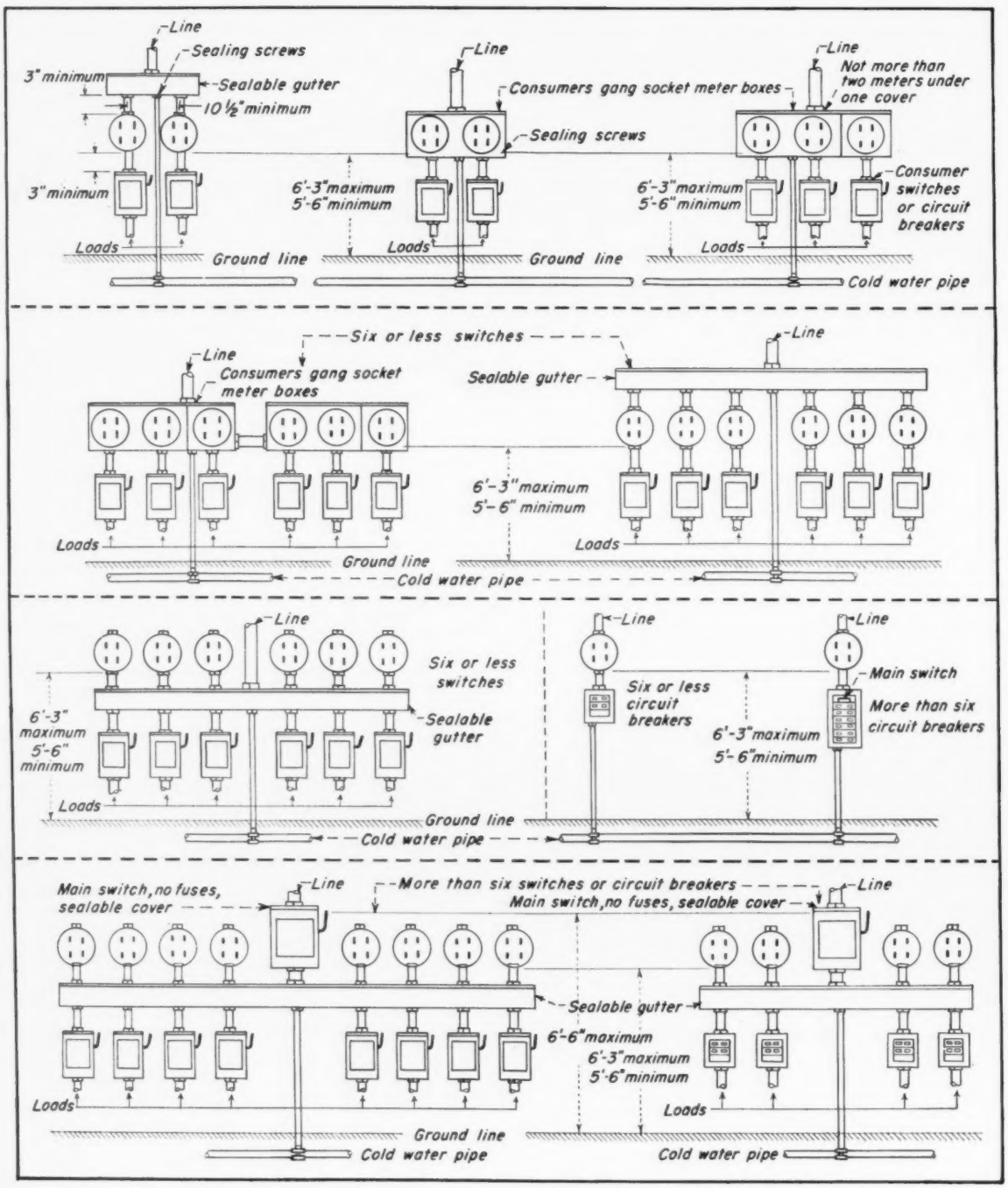
You can put your confidence in—

GENERAL ELECTRIC

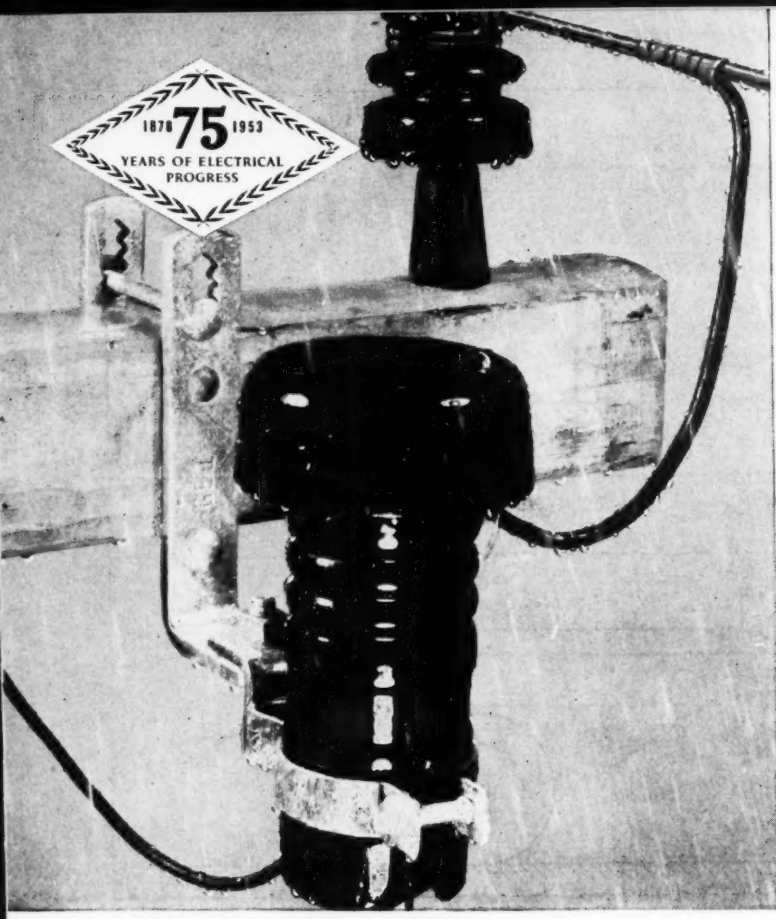
Meter Grouping for Residential Service

Typical installations are for 120/-240-v, single-phase service in apartments, courts, and large residences with numerous divisions of load. Groups are adapted from standards of California Electric Power Co and meet National Electrical Code, state and local ordinances.

H. M. WILLIAMS, Electrical Inspector, California Electric Power Co, Riverside, Calif.



1. When exposed to weather, equipment must be waterproof.
2. A main switch must be installed if more than six switches or circuit breakers have to be opened to disconnect electric service in the building. This main disconnecting switch shall not be fused and shall have a sealable cover. A sealable circuit breaker may be used instead.



General Electric Pellet Arresters give the same excellent protection to transformer windings in wet weather or dry, in low humidity or high, when new or after years of service. And their low sparkover voltage and low IR drop assure a degree of this protection unexcelled by any other distribution arrester.

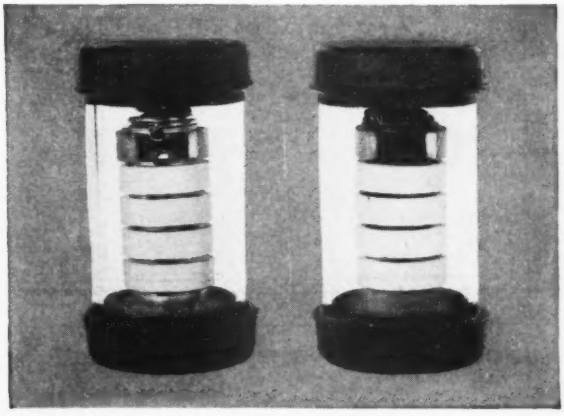
MOISTURE doesn't hurt this arrester

The General Electric Pellet Arrester has a unique valve element that is unaffected by service moisture—and gap electrodes that are sealed in dry nitrogen (N_2)—exclusive features that mean more enduring protection against lightning.

In addition, pellet arresters use inorganic insulation throughout—no internal fiber to "track", carbonize or wear away. Whether valve- or expulsion-type, no other distribution arrester is so unaffected by service moisture.

For more information see your nearest G-E Apparatus Sales Office, or write for Bulletin GEA-2975 to Section 432-2, General Electric Co., Schenectady 5, N.Y.

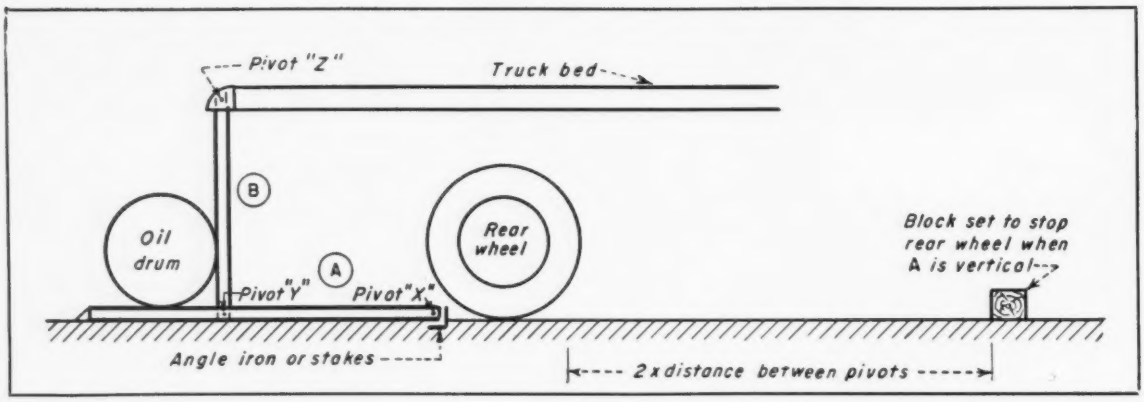
Valve Element Unaffected by Service Moisture! Efficient valve element is a column of lead peroxide pellets—pellets which are actually formed with water in a tumbling barrel (above). Moisture in service causes no change whatever in the unexcelled protective characteristics of this pellet valve column.



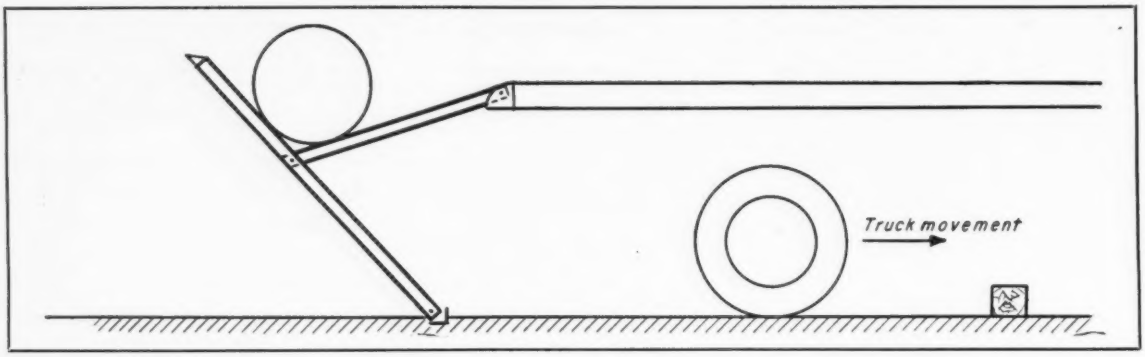
N_2-filled Gap Excludes Corrosive Moisture! Here's life-test proof: electrodes at left were sealed in dry nitrogen—those at right sealed in air, and both exposed outdoors under maximum rated voltage. Result: N_2-protected gaps are bright and clean; gaps sealed in air are discolored and corroded.

You can put your confidence in—

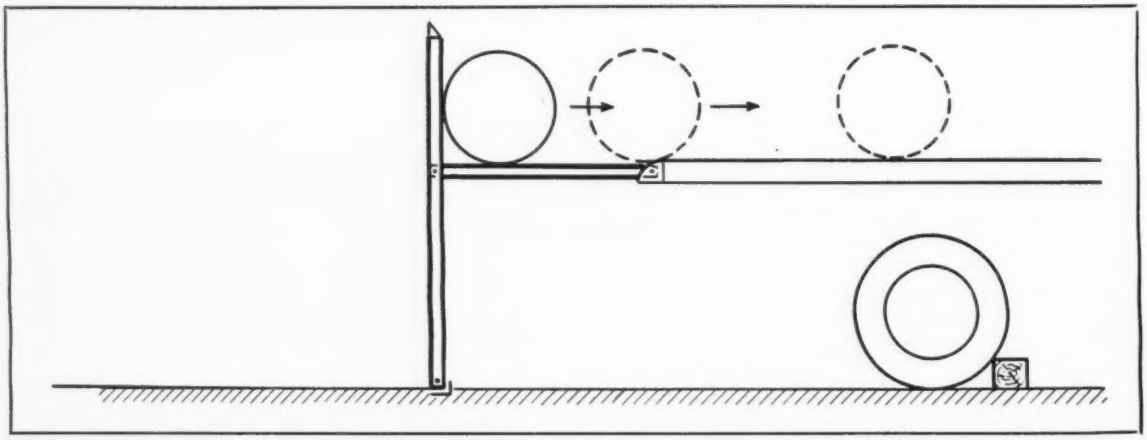
GENERAL ELECTRIC



Drum is rolled on hoist



Truck pulls forward, raising load



Load is easily transferred to truck

Elevator Aids Loading Oil Drums on Trucks

O. O. HENDERSON, District Engineer, Kentucky and West Virginia Power Co, Ashland, Ky.

A simple hoist was developed that eliminates injuries to men due to failure of skids. It is particularly applicable in any oil-drum storage yard where a few drums have to be loaded onto each truck, but can be used for other purposes when trucks are not equipped with hoists.

After a drum has been rolled onto the device in its ground-level position, the drum is raised to truck-bed level by forward movement of the truck a few feet. To prevent moving strut A past its vertical position, a block can be placed ahead of the rear wheels about twice the distance that the truck bed is above ground.

(*Continued on page* 116)

Another DELTA-STAR *First*

330 Kv MK-40

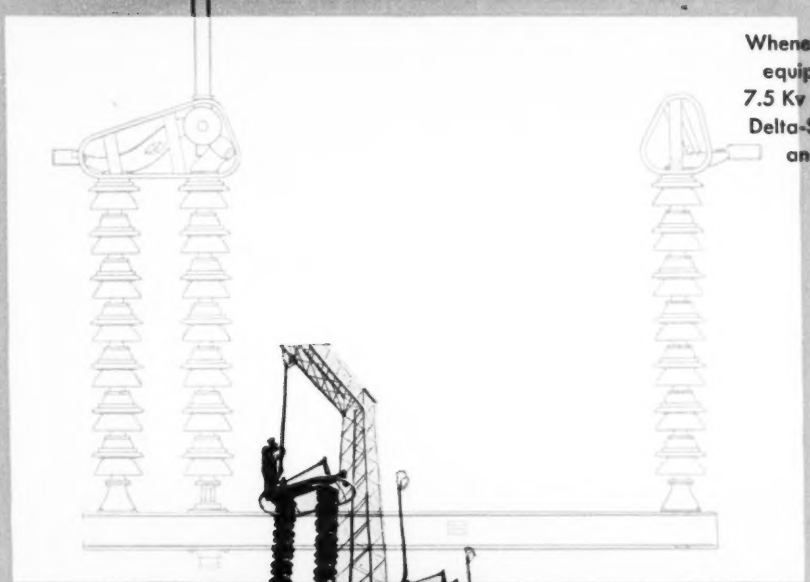
VERTICAL BREAK AIR SWITCH

For well past a quarter of a century Delta-Star has pioneered in the high voltage switching field. Through constant research and development they have consistently been first in the manufacture of super-high voltage switching equipment.

Today Delta-Star is engaged in the commercial manufacture of the first 330-Kv air switches to be sold in the U.S.A.

Like all Delta-Star "MK-40" switches they incorporate the latest and most refined improvements.

Whenever you need switching equipment whether it be for 7.5 Kv or super-high voltages, Delta-Star has the knowledge and facilities to provide you with the best the industry has to offer.



Delta-Star 287-Kv switches on the Boulder Dam transmission lines to Los Angeles.

WHEN YOU WANT THE BEST IN HIGH VOLTAGE SWITCHING EQUIPMENT SPECIFY DELTA-STAR

DELTA-STAR ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.
2437 FULTON STREET, CHICAGO 12, ILLINOIS
DISTRICT OFFICES IN PRINCIPAL CITIES

Phelps Dodge Rectangular

SAVE SPACE—IMPROVE

The application of thin film insulation to rectangular or square wire—pioneered by Phelps Dodge —permits . . .
✓ BETTER SPACE FACTOR
✓ SMALLER COILS—LESS IRON
✓ BETTER FORMING AND WINDING
✓ OVER-ALL SAVINGS IN COST

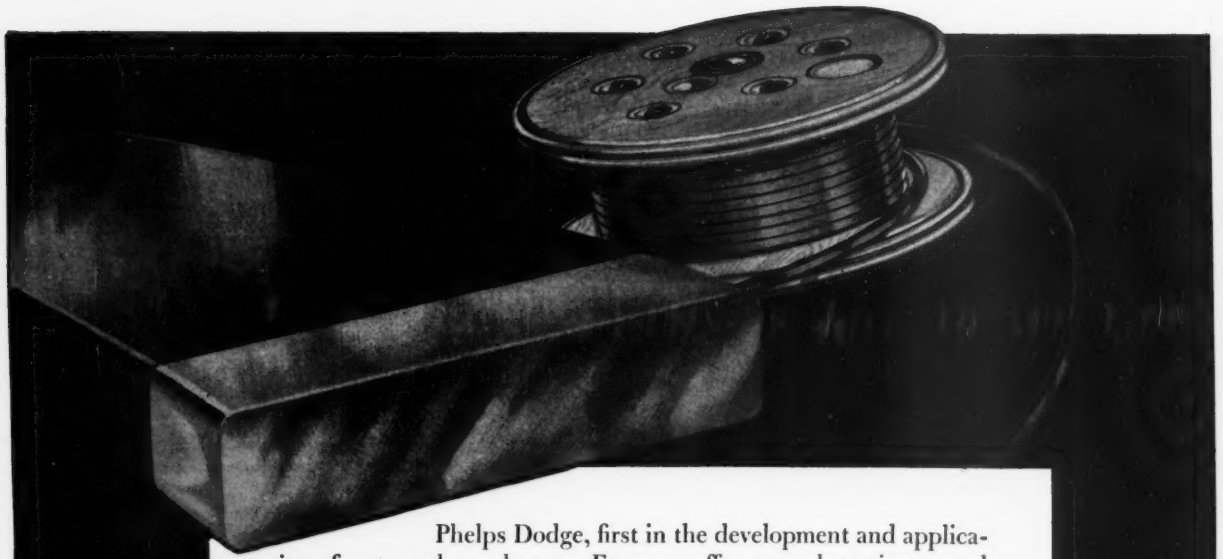
"It takes the best

PHELPS DODGE COPPER PRODUCTS

CORPORATION

or Square Formvar Helps You

DESIGN AND EFFICIENCY



Phelps Dodge, first in the development and application of rectangular and square Formvar, offers a product, time-tested for applications where space is at a premium and where the outstanding abrasion, chemical and forming properties of this *thin film* magnet wire can be utilized. When used under fabric (glass and cotton), it improves dielectric and moisture resistance, and makes possible over-all savings in the insulation system. Available in volume over a complete range of sizes.

Any time magnet wire is your problem, Phelps Dodge has the quickest, easiest answer!

to make the best!"

INCA MANUFACTURING DIVISION

FORT WAYNE. INDIANA

Elevator Aids Loading

(*Continued from page* 112)

The hoisting device was made from four short pieces of 2-in. pipe cross-braced in pairs so they may be hinged together. The ground pivots X may be stakes driven into ground, provided there is no danger of damaging underground cables. Where the latter exist, the ground pivot may be a suitable angle iron or pipe concreted in the drum storage yard. Methods used to couple the device at point Z to the truck may vary. Many line-truck beds have a bar across the rear that may serve as the hinge. If trucks with different bed levels are used, the device will have to be adjustable.

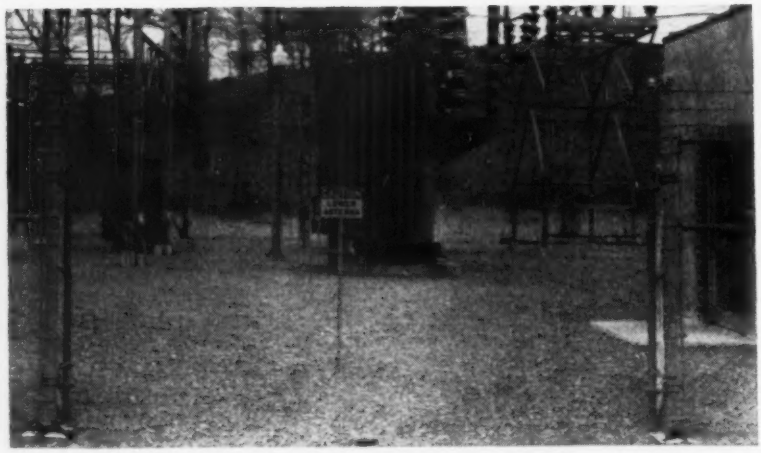
Sign Warns to Lower Mobile Antennas

J. H. DAVIS, Dist. Gen. Foreman, Appalachian Electric Power Co, Abingdon, Virginia

The portable sign illustrated is used to prevent automotive drivers entering a station yard while the vehicle's antenna is raised. The sign reads "CAUTION—Lower Antenna" and is set in a ground socket in the center of the gateway.

This warning is placed 5 ft inside the station yard, where it prevents entrance of a vehicle until the sign is moved. All employees have been instructed to replace the sign in its socket when they leave the lot.

A 10x14-in. "Caution" panel painted white is used on this safety device. Panel frame is made from a 30-in. crossarm brace which is bolted to a 6-ft 8-in. length of 1-in. galvanized conduit. Ground socket is a 20 in. piece of 1¼-in. galvanized conduit set in concrete. Labor was one man-hour.



WARNING SIGN placed 5 ft inside the gate must be removed before vehicles go into the station, thus reminding drivers of the hazard of antennas contacting energized circuits

The sign was devised because the danger of contacting energized circuits with antennas has greatly increased. The hazard is greater because of the increasing number of substations being built or provided with more equipment, and of the large number of vehicles equipped with radio sets.

How a Temperature-Indication Error Was Found and Remedied

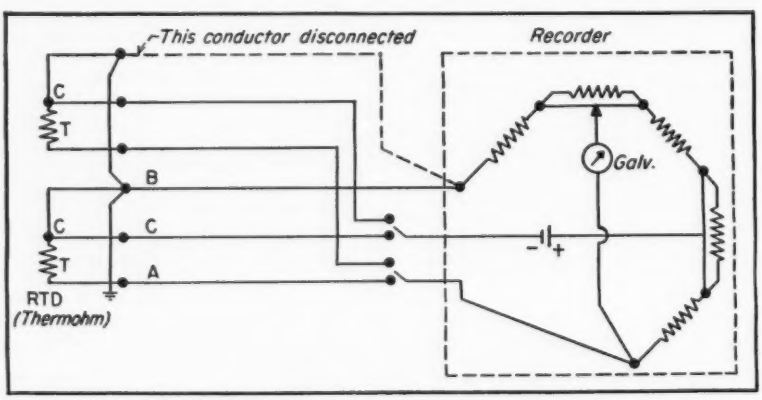
J. H. PENNELL, Electrical Maintenance Dept, The Ohio Power Co, Philo, Ohio

Temperature recorder readings may be verified by a check coil substituted for the resistance thermal detector when accessible on a generator, or when a question arises as to the condition of cables.

On this subject, here is related an experience with faulty indication and recording of stator and gas temperatures of both high and low-pressures machines of Unit 4 at Philo station.

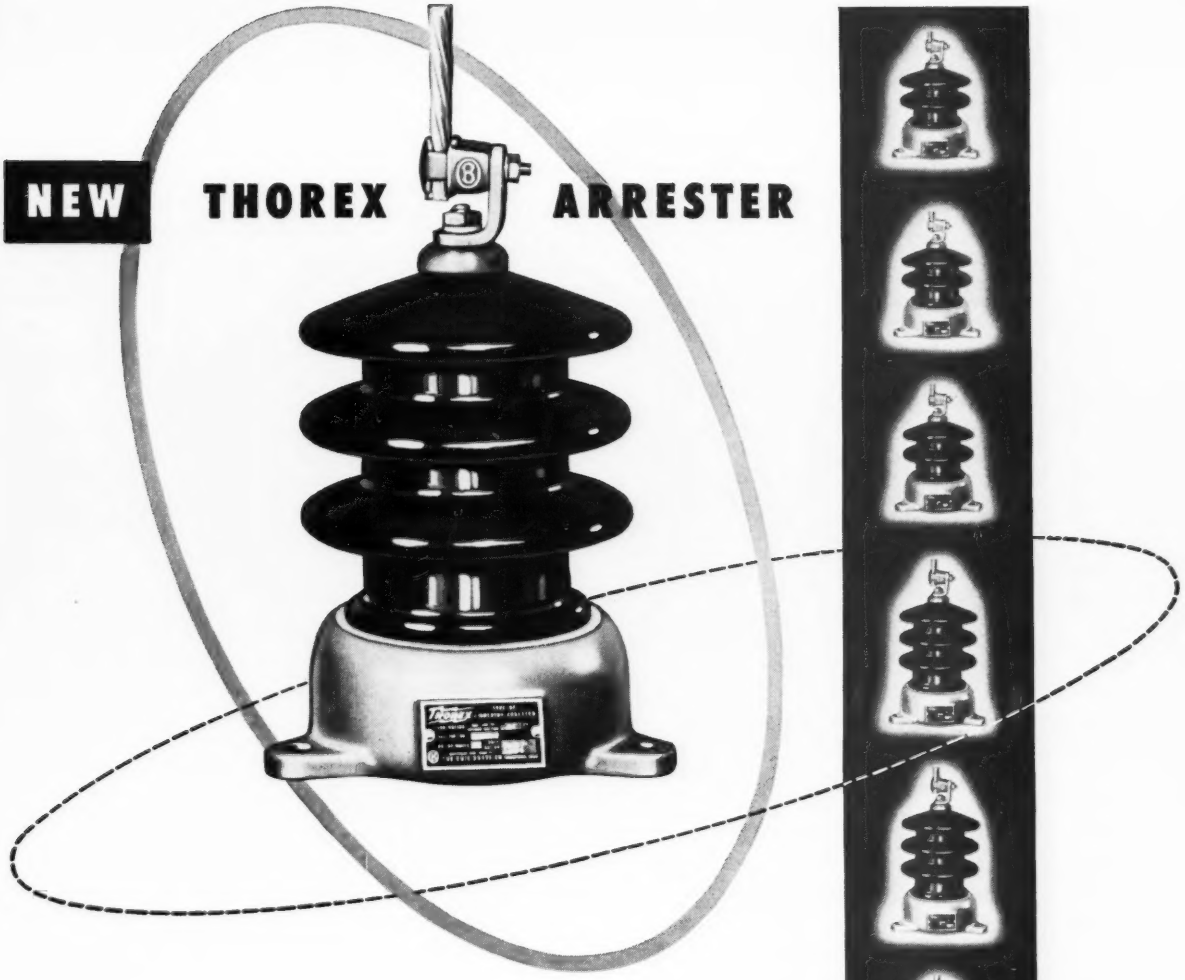
Last summer the deep wells used for cooling the hydrogen gas were abandoned and service water was taken from the river. With this water around 80 F in the summer, it became impossible to operate Unit 4 at normal load and still keep the cooling gas temperature within allowable limits.

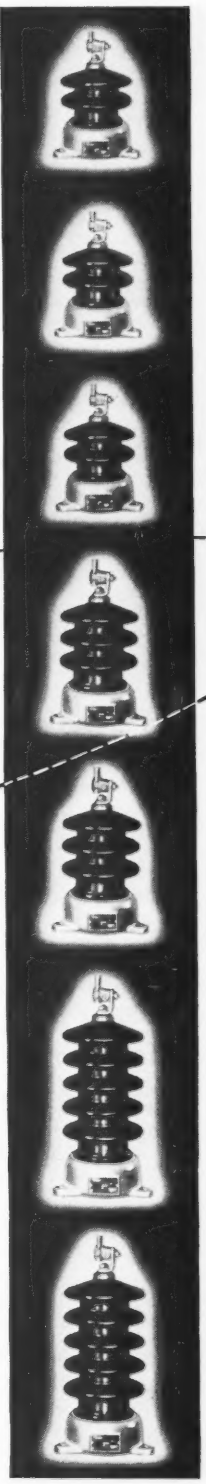
Cause for the seemingly high temperatures was sought. Temperature recorders were checked and found in near-perfect calibration. It was impossible to check the remainder of the temperature-recording circuit while the unit was in service because of the generator cable termination. Then the generator coolers were cleaned, the



TEMPERATURE RECORDER and external circuit to resistance thermal detectors (RTD). Conductors A and B must have equal resistance, otherwise any difference will be added to or subtracted from the resistance of the detector coil and will introduce a temperature error

NEW **THOREX** **ARRESTER**





for close-clearance mounting!

Retaining all of the excellent protective characteristics of the Type GP Thorex lightning arrester, the new GPA Model permits a radical reduction of mounting clearance dimensions. This makes for easier installation in the confined spaces of unit substations or other restricted enclosures. When mounted indoors within enclosed switch gear, this arrester may be installed in upright, horizontal, or inverted position, thus permitting full advantage to be taken of its close spacing possibilities. Universally adjustable terminals allow for any direction of lead.

Restricted clearance in the new Thorex GPA is obtained by all-porcelain top construction, where the energized element is confined to a small central stud and terminal, thus gaining over six inches of radius when compared to the arrester employing a top casting energized at line potential.

Another improvement in the new Type GPA Thorex is a closer graduation of line-to-ground, power frequency voltage ratings. This arrester is now available in 3, 4.5, 6, 7.5, 9, 12 and 15-kv values.

Other than clearance, the Model GPA is identical to the metal-top Thorex line -- offering you a high level of lightning protection at low cost.

Ohio Brass

MANSFIELD **OHIO, U.S.A.**

4386-H

BERMICO INSPECTION NEVER ENDS—

For over 25 years, our quality control men have inspected every length of BERMICO Conduit from top to bottom, inside and out—looking for flaws. If there's the slightest defect, the conduit is rejected at once.

That's just one example of the care taken to insure BERMICO's high quality from raw material to finished conduit.

Made by Brown Company from sturdy wood fibre, impregnated with pitch, BERMICO Electrical Conduit is—

•LIGHT •TIGHT •STRONG •WATERPROOF •UNIFORM

•ACID-RESISTANT •SMOOTH INSIDE AND OUT

For surest cable protection, be sure to specify

BERMICO® FIBRE CONDUIT

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cooling water system carefully inspected, and the volume of water found to be more than ample. But Unit 5 showed no trouble, yet it duplicates Unit 4 in every detail even to taking cooling water from the same header. Consequently, suspicion was directed toward instrumentation.

Discovery was made when Unit 4 high-pressure machine was removed from service to repair a gas leak in a bearing. With the end shield removed, the resistance thermal detectors were accessible. Mercury thermometers taped to each detector showed temperatures 6C higher than the meter readings. A thermocouple placed in close proximity to the detector checked the thermometer indications.

It was then obvious that the trouble was external to the meters. The temperature bridge circuit is shown. Inspection of the cable installation disclosed the fact that temperature conductors were carried in both of two separate cables. By error both "B" conductors had been initially connected to the jumper joining one side of each thermal detector to ground. Consequently, two "B" conductors were always in parallel, giving a lower resistance than one "A" conductor, and resulting in the + 6C error.

This condition was easily corrected at the recording instrument panel by disconnecting one "B" wire since all temperature conductors were alike and of equal length.

Difficulties were encountered on the generator control panel where the indicating instruments are located because the conductors differ greatly, and Unit 5 is also involved. Since the error here is known to be 5C, corrections in readings are necessary until suitable switching arrangements are made to correct the indicating instrument readings.

In this case, if the check coil had been substituted initially at the generator for the resistance thermal detector, immediate indication would have been obtained that something was amiss.

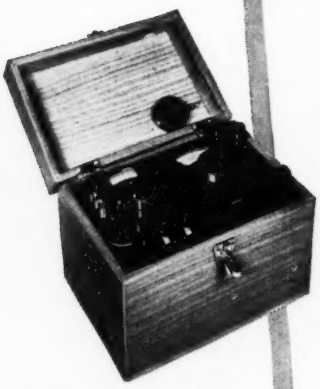
Cotton Cord and Biplane Lay Line on Tough Terrain

To eliminate damage to trees and foliage in building a portion of a 44-kv transmission line through a heavily wooded forest and water reserve, Hawaiian Electric Co used a half-mile

FOR

"on-the-spot" checking...

INVESTIGATE THESE WIDELY-USED TEST SETS



In appearance, the 8657-C Indicator is typical of L&N test sets and is outstanding for fully dependable, moderate precision. The portable series also includes instruments for measuring temperature, electrolytic conductivity, electrical resistance and pH.

High on any list of "musts" for making spot-checks of power production processes and equipment are these L&N Test Sets. For these versatile instruments combine the portability, ruggedness and simplicity of design needed for plant use, with the accuracy and flexibility necessary for use in the laboratory.

Specifications for just a few of these instruments that are particularly useful to the Power Industry appear below. For more complete information, contact our nearest office or write 4938 Stenton Ave., Phila., Penna.

The 7664 L&N Stabilized pH Indicator gives direct readings in pH in either grounded or ungrounded solutions. It is also used in oxidation-reduction measurements.

FOR pH AND REDOX MEASUREMENT

Instrument	List No.	Range	Limit of Error
Stabilized pH Indicator — for direct reading in pH; also for oxidation-reduction measurements. May be used in grounded or ungrounded solutions. For operation on 115 volts, 60 or 50 cycles.	7664	0 to 14 pH; 0.1 pH divisions 0 to ± 700 mv; d-c; 5 mv divisions 0 to ±1400 mv; d-c; 10 mv divisions	1 scale division

FOR THERMOCOUPLE EMF MEASUREMENT

Double-Range Portable Millivolt Indicator. For thermocouple voltage measurements — reads in millivolts; manual reference junction compensation.	8657-C	Ranges: 0 to 16 mv and 16 to 64 mv. Reference Junction Compensator Ranges: 0 to 1 mv and 0 to 5 mv.	Low Range: ±0.05 mv. High Range: ±0.15 mv.
Double-Range Portable Millivolt Indicator. A more precise instrument for uses similar to 8657-C.	8662	Ranges: 15 x 1 mv +1.1 mv slidewire 15 x 5 mv +5.5 mv slidewire Reference Junction Compensator Ranges: 0 to 1 and 0 to 5 mv.	Low Range: ±0.01 mv. High Range: ±0.05 mv.

FOR ELECTROLYTIC CONDUCTIVITY MEASUREMENT

Portable Electrolytic Resistance Indicator For measuring resistance of electrolytic solutions. Operates at 115 volts, 60 cycles.	4960	0.3 to 30,000 Ω	±1%
Portable Conductivity-Resistivity Indicator. For general use in measuring the specific conductance and specific resistance of electrolytic solutions. Operates at 115 volts, 60 cycles.	4866	Specific Conductance: 0.012 to 0.000,0001 mho per centimeter cube. Specific Resistance: 80 to 10,000,000 Ω per centimeter cube.	±0.3%

FOR RESISTANCE MEASUREMENT

Type S-1 Portable Wheatstone Bridge. For ordinary resistance testing and for locating faults in communication circuits.	5300	Useful range: 1 to 50,000 ohms direct measurement. Will measure approximate resistance at lower and higher values; also has provision for making Murray and Varley loop tests.	±.15%

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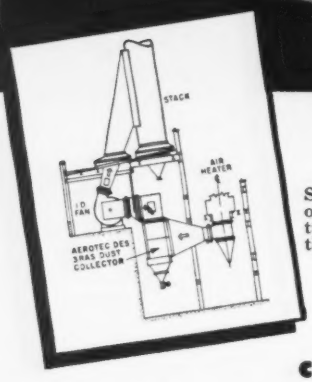
instruments *automatic controls • furnaces*

Journal Ad. No. E-0600(1c)

another power plant application of the
AEROTEC DUST COLLECTOR
promoting better community relations



Riverton Station
Northern Virginia Power Company

Sectional drawing shows location of AEROTEC Dust Collector between air heater and I.D. fan at this Riverton Station.

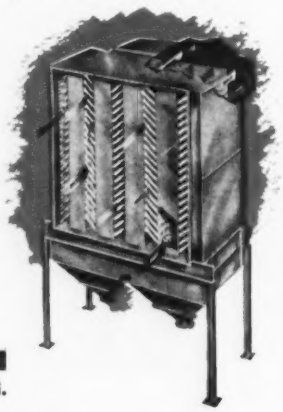
Promote your
community relations
the highly efficient Aerotec way

A clean stack has proven time and again to pay valuable dividends in community good will. To gain this advantage, plus plant erection and maintenance economies, public utilities are specifying the Aerotec Design 3 RAS Dust Collector. This unit develops a higher centrifugal force through the use of multiple, small-diameter tubes, resulting in exceptionally high efficiencies on ultra-fine dusts.

Flexible and space-saving

The tubes are permanent mold aluminum and closely nested to provide lighter weight and more capacity per square foot of plan area than any collector of comparable efficiency. They are set at a 45° angle on vertical tube sheets, factory-assembled into lightweight "building block" sections that reduce installation time and permit the Aerotec Design 3 RAS to be easily tailored to fit available space.

Our field engineers specialize in solving flyash collection problems and welcome the opportunity to assist you at any time. Call or write. No obligation.



Project Engineers
THE THERMIX CORPORATION
GREENWICH, CONN.
(Offices in 38 Principal Cities)
Canadian Affiliates: T. C. CHOWN, LTD.
Montreal 25, Quebec Toronto 5, Ontario

THE AEROTEC CORPORATION
GREENWICH, CONN.

of ⅛-in. cotton cord and a biplane. Original plan was to use a helicopter to lay a ⅛-in. steel cable between pole locations, as had been done on a previous project (EW, April 10, 1950, p 96). But the helicopter was unavailable and a biplane used for towing advertising signs was substituted.

In preparation for the string laying operation a half-mile of 200-lb breaking strength cotton cord was laid out on a nearby airport runway with a modified wind sock attached to the windward end. The other end of cord was attached to a steel ring that had a 3-lb sash weight secured to it. The ring was placed in the towing hook on the plane.

After the plane took off and circled out to sea, it flew inland directly over the target. Then the ring was released from towing hook and the sash weight pulled the cord to the ground. The wind sock settled on the other end, leaving the cord lying on tops of trees and heavy brush along right-of-way.

Two spans of 1,700 ft and 220 ft were covered in this way. A ⅛-in. extra-high-strength steel cable was pulled in with the cotton cord. This in turn was used to pull in a ¼-in. diameter steel cable, by which conductors were finally pulled in.

Plastic Protection Added For Parts in Storage

W. B. LEWELLEN, Mechanical Engineering Div, American Gas & Electric Service Corp, New York, N Y

A thick, non-adhesive, hot-dip, plastic coating is used to give precision machine parts, tools, etc. protection against abrasion and corrosion during storage. The coating is applied by dipping the parts to be protected into the melted plastic (350 F). The process requires simple and relatively inexpensive equipment and is suitable for use in the storeroom where one or several pieces are to be coated at a time. Small parts are coated at less than one cent each.

Advantages—The hot-dip coating process and the plastic have the following advantages (after tests with cold-dip materials):

(a) Produces a coating approximately 1/10 in. thick that, being rubber-like and tough, gives long-term protection against scratching and

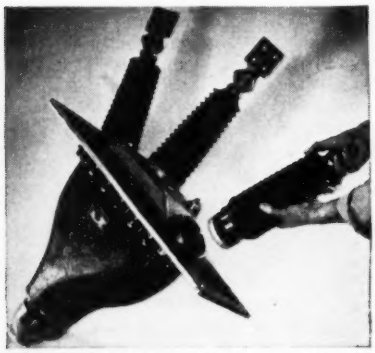
(*Continued on page* 124)

Lugs, insulators, bell shapes, and cable entrances are all interchangeable. This is an important feature of AnacondA Potheads.

ANACONDA POTHEADS

This complete line is engineered by power-cable specialists for use with *any* make of cable. Parts are *fully* interchangeable for greater adaptability, faster delivery, easier installation and lower cost.

Not hundreds—but thousands of different ANACONDA Potheads can be made up from relatively few interchangeable parts. There's a type for every use—capnut, transformer, switchgear, disconnect, and through types.



Replacement of damaged insulators is simple on AnacondA Potheads. Note the ease with which any insulator can be quickly inserted.

Over 2000 different pothead assemblies can be furnished from standard parts for any particular conductor size and voltage rating in the multi-conductor capnut type alone!

To keep pace with the increasing demand for ANACONDA Accessories, it has been necessary again to greatly increase the facilities of the Cable Accessories Department. This Department is now in a position to promise prompt shipment on most of your orders.

Service continuity demands both power cable and its accessories built to highest standards. Top performance from ANACONDA Cable Accessories is assured because they are designed by engineers who are power-cable specialists.

Make Anaconda your headquarters for potheads, jointing kits, insulating compounds, paints, etc. For help on your cable and installation problems call on your Anaconda Representative to get the benefit of Anaconda's engineering experience. 52461

Accessories for all types and sizes of bare and insulated conductors.

ANACONDA®

Anaconda Wire & Cable Company,
25 Broadway, New York 4, N. Y.

Send me Anaconda's new 100-page Pothead and Terminal Catalog for use as a reference book and to simplify ordering and specifying.

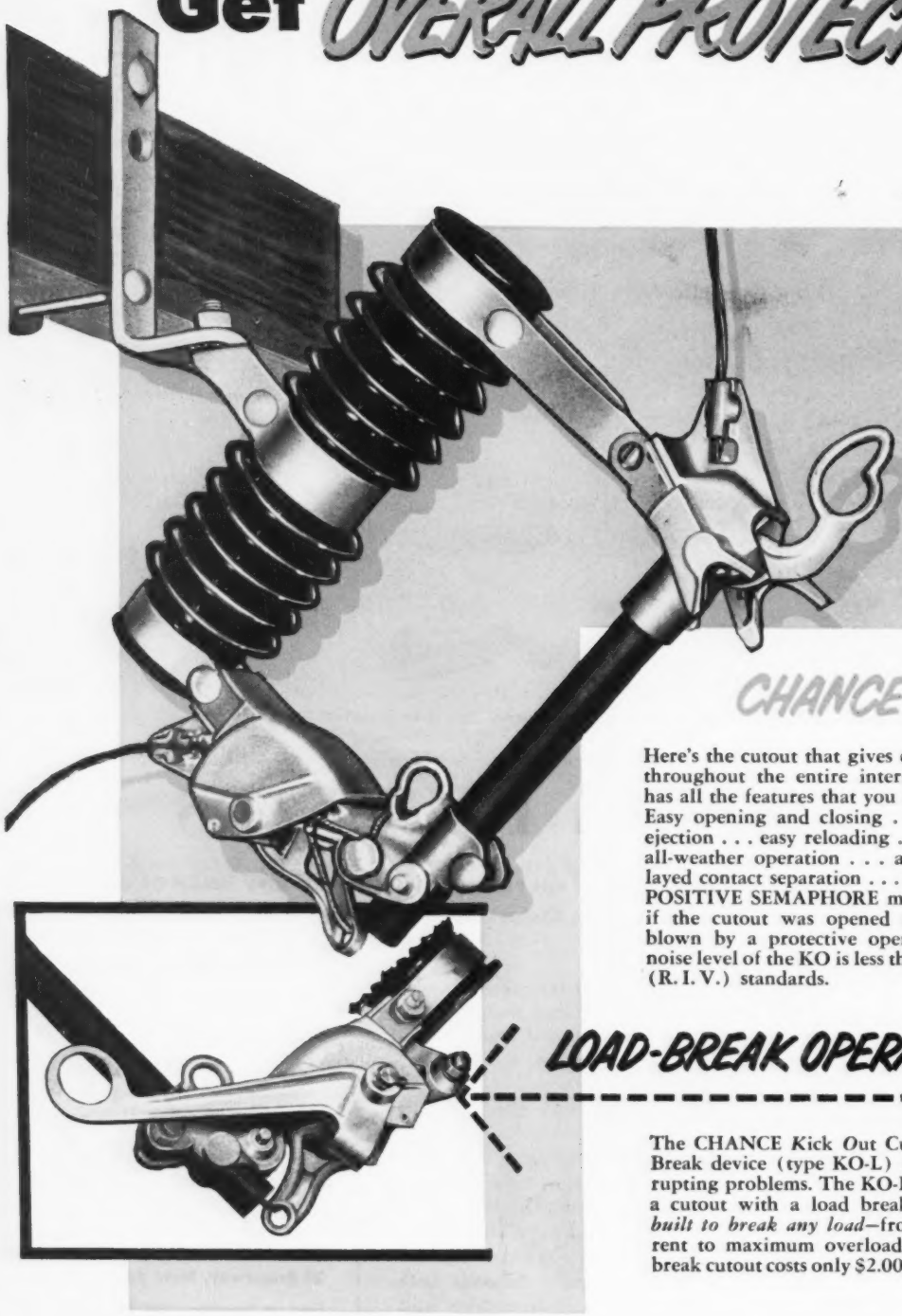
NAME.....

FIRM.....

ADDRESS.....

CITY.....STATE.....

Get OVERALL PROTECTION with



CHANCE KO

Here's the cutout that gives overall protection throughout the entire interruption range. It has all the features that you want in a cutout: Easy opening and closing . . . fast fuse link ejection . . . easy reloading . . . protection for all-weather operation . . . automatic time-delayed contact separation . . . *and* the exclusive POSITIVE SEMAPHORE method of showing if the cutout was opened manually or was blown by a protective operation. The radio noise level of the KO is less than 10% of NEMA (R. I. V.) standards.

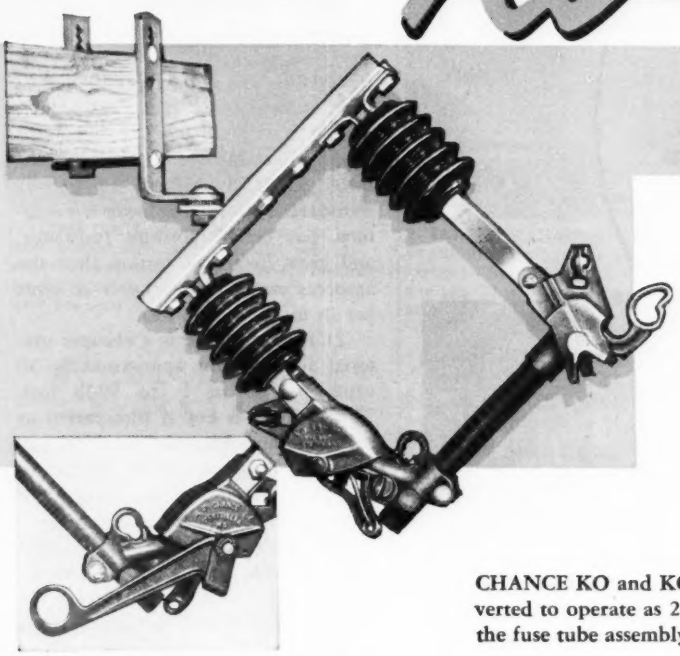
LOAD-BREAK OPERATION, TOO

The CHANCE *K*ick *O*ut Cutout with a Load Break device (type KO-L) solves many interrupting problems. The KO-L is more than just a cutout with a load break attachment—it's *built to break any load*—from the lowest current to maximum overloads. The KO-L load break cutout costs only $2.00 more than the KO.

CHANCE KO-H

Now, to meet the increased capacity on growing systems, a *heavy-duty* CHANCE *K*ick *O*ut Cutout (type KO-H) has been added to the line. The KO-H has a heavier fuse tube for 5000 amp interruption rating. This KO-H fuse tube may also be purchased separately for use in standard KO Cutouts to increase interrupting capacity. The CHANCE KO line is worth looking into when choosing *your* cutouts. Write for complete information today.

CHANCE KickOut Cutouts

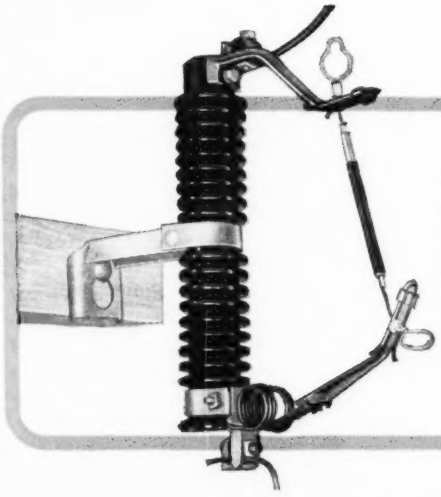


CHANCE KO-T

CHANCE also offers a double insulator type KO-T Cutout. The cutout insulators meet NEMA cutout standards. NEMA switch insulators are also available for higher flashover and greater leakage distance. CHANCE KO-T Cutouts have the same features as the KO and can also be supplied for Load Break operation.

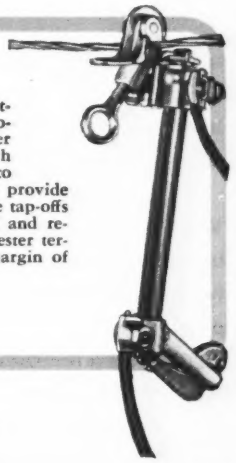
* * *

CHANCE KO and KO-T Cutouts, 7.5 or 15 KV, may be converted to operate as 200 amp disconnects by merely replacing the fuse tube assembly with a KO Disconnect Blade.



The CHANCE Cutout line also includes open link cutouts to provide inexpensive fuse protection with low R. I. V. for distribution lines. Type EM is built to function smoothly, even after hard usage and hundreds of repeated operations. It will take 1 to 50 amp fuse links.

Chance Suspension Cutouts give low cost protection for transformer installations or branch line taps on 2300 to 15,000 volt lines. They provide protection for rural line tap-offs and are easily installed and removed. A lightning arrester terminal adds an extra margin of safety for equipment.



You know it's RIGHT when you specify CHANCE

C53-1

ABC INDUSTRIES

A·B·CHANCE CO·

CENTRALIA, MISSOURI • SAN FRANCISCO, CALIFORNIA

GO on GREEN

as they will at

Murray Gill Station*

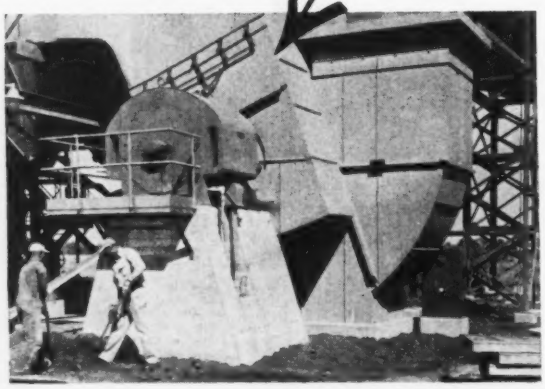
Kansas Gas and Electric Company

Wichita, Kansas

GREEN
Double Inlet ID Fan

Design capacity 256,500 cfm @ 383°F. 28.65" Bar; 10.16" SP; 705 RPM 595 HP. Special control type louvre inlet dampers; outlet dampers; inlet boxes; air-cooled bearings and sun shields.

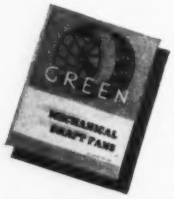
The installation includes a Green Forced Draft Fan.



*Designed by Ebasco Services Incorporated

Two exacting buyers were involved in this installation: the owners and the consulting-design engineers. That they have entrusted to Green Fans the important work of supplying combustion air is in itself a stamp of approval. Their decision might be helpful to you in selecting fans for your power plant project.

We have been designing and making draft fans for 48 years. This is indicative of our experience. We have supplied fans for many of the leading utility and industrial power plants now under construction or recently completed. This is indicative of our modern designs and fabricating methods.



Our Catalog No. 168 tells all about Green Fans. Write for a copy.

THE GREEN Fuel Economizer COMPANY INC.

- Economizers
- Fans
- Air Heaters
- Cindertraps
- Aerodyne Dust Collectors

BEACON 3, NEW YORK

Plastic Protection

(*Continued from page* 120)

nicking to parts in contact in storage bins.

(b) Excludes air and contains an anti-corrosion agent.

(c) Transparent enough to read numbers and attached identification tags without removing plastic.

(d) Easily peeled off the dipped piece for reuse.

Materials—The hot-dip plastic is supplied in two grades, clear and amber.

(1) Clear plastic is recommended where protection from rust is needed for a period of years. It has greater transparency, is used at lower temperature, has better moisture resistance, and gives longer protection than the amber. Cost is approximately 90 cents per lb in 1- to 99-lb lots.

(2) Amber plastic is a cheaper material and sells for approximately 50 cents per lb in 1- to 99-lb lots. This material is not as transparent as the clear; however, part numbers, etc. can be read easily. It is inferior to the clear for long-term storage but gives equal resistance to abrasion.

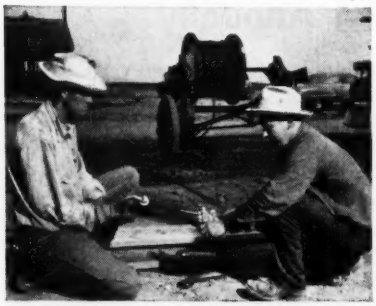
Any melting pot of the desired capacity with an adjustable thermostatic control that will maintain the melt at about 350 F is suitable such as a type used for melting waxes and solders.

Application of Coating—A quantity of the plastic is placed in the melting pot and heated until liquid. A few trial dips will soon indicate the proper temperature and consistency for best results. Over-heating is to be avoided as this will deteriorate the plastic causing it to darken and produce an odor. A thermometer, reading over 350 F, is useful until the proper setting of the heat control on the melting pot is found. The temperature of the melt will determine the thickness of the resulting coat; higher temperatures produce thinner coats.

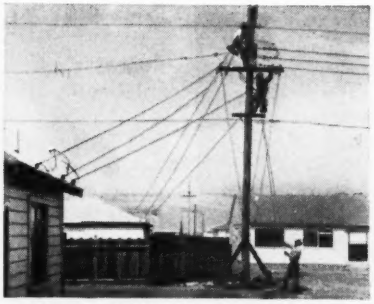
The part to be coated is wiped free of loose dirt and grease, then held by pliers, wire hook, string, or other convenient means, and dipped into the liquid plastic and withdrawn. The piece should be held suspended for a few minutes until the plastic is firm and then be laid aside until cool. Large pieces that cannot be immersed in the pot can be coated on one half, and when the coating has cooled, reversed and the other half dipped.

Count the advantages

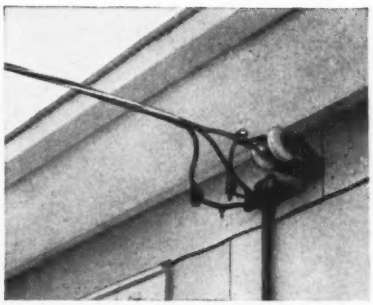
WHEN YOU SPECIFY ALUMINUM CONDUCTOR



1. LOWER COSTS—Aluminum costs far less than copper; thus, automatically provides important savings. And because aluminum weighs so much less than copper, handling costs are less.



2. EASIER INSTALLATION—The light weight of aluminum conductor makes it easier for crews to handle, string, move around on the job. This insures faster, lower cost installations.



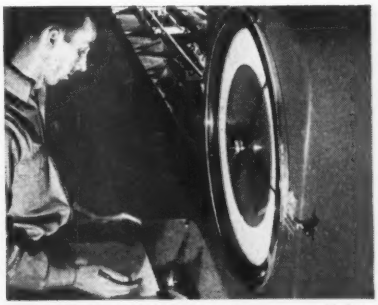
3. LESS MAINTENANCE—Aluminum's lightness puts less strain on house, pole, fittings—reduces maintenance. *Total* savings with aluminum conductor can be as much as *35 per cent!*

Count the extra advantages

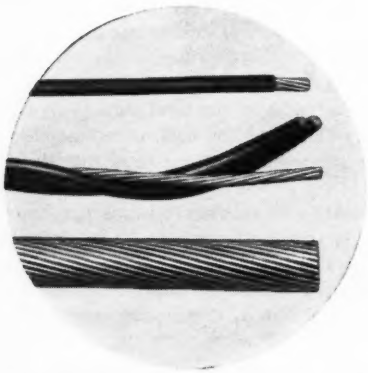
WHEN YOU SPECIFY KAISER ALUMINUM CONDUCTOR

1. FIELD SERVICE—Installation experts from Kaiser Aluminum work with crews, demonstrate newest techniques, help reduce costs. Their familiarity with schedules helps maintain Kaiser Aluminum's unsurpassed record for *on-time delivery!*

2. ENGINEERING SERVICE—Meetings with crews are conducted by Kaiser Aluminum engineers. Studies are made to help solve specific problems. They help coordinate specifications, purchases, designs, and furnish sag and tension charts on request.



3. LABORATORY SERVICE—Always available to customers are the services of Kaiser Aluminum's own laboratory. It's one of the best-staffed and best-equipped laboratories in the industry. This research helps assure maximum quality, service, economy.

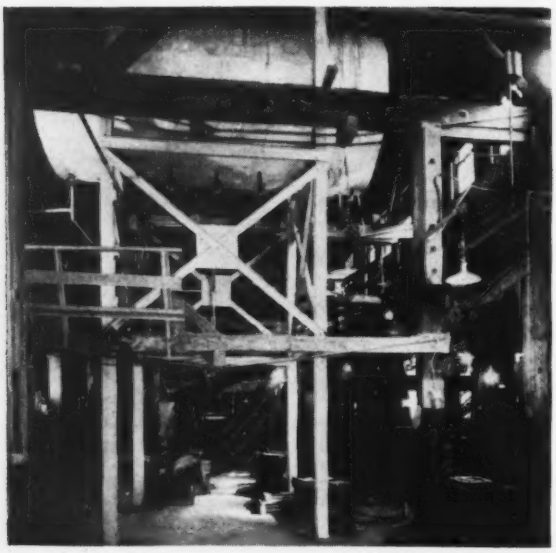


THE EXTRA advantages of *complete service* are yours at no obligation when you specify Kaiser Aluminum conductor. *Act now!* A letter or telephone call is all that's required. Also request free pamphlet giving complete engineering data on new Kaiser Aluminum covered conductor—both weatherproof line wire and self-supporting Triplex cable for service drops and secondary distribution lines. Contact any Kaiser Aluminum office in principal cities, or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, California.

Kaiser Aluminum

setting the pace . . . in growth, quality and service

NEOPRENE AND POLYETHYLENE COVERED CONDUCTOR, SOLID AND STRANDED • SELF-SUPPORTING TRIPLEX CABLE • ACSR • ALL ALUMINUM CONDUCTOR



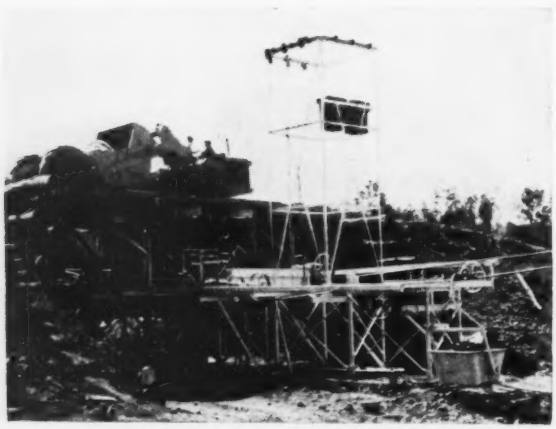
CEILING MOUNTED electric water heater keeps runways beneath free for traffic. Hot water makes better clay mixture and a stronger, more durable firebrick. Water is heated during off-peak periods

Electric Water Heater Saves $1534 Annually

ROBERT T. GRUNENWALD, Advertising Assistant, West Penn Power Co, Pittsburgh, Pa.

A better refractory and an appreciable saving of money resulted from installing an electric water heater at the Eureka Firebrick Co., Mount Braddock, Pa. Company found that heating their process water to 200 F before mixing it with the clay makes a better mixture of clay and a stronger, more durable firebrick. Viscosity of the clay is reduced before it enters the pug mill making it easier to handle—thus faster to work.

Installation consists of a 4000-gal insulated tank equipped with four, 18-kw, 3-phase, flange type immersion heaters. Tank is placed near ceiling on steel supporting structure, leaving runways beneath free for traffic. Water is heated off-peak at estimated saving of $1534 a year over old method of heating water in a coal-fired boiler.



LOADING aluminum buckets at pits with freshly mined clay. Each bucket carries 2000 lb clay over 3-mile distance from pits to kilns

SPEEDY TRAMWAY increases production and requires less labor to haul clay compared with old railroad car system

Electric Aerial Tramway Sextuples Production

JOE W. PARRIS, Advertising Dept, Georgia Power Co, Atlanta, Georgia

The installation of a new electric tramway at the Burns Brick Co, Macon, Ga., has increased production six times and requires only one-third the number of men needed with the formerly-used railroad car method. The 187 aluminum buckets used in the tramway system transport clay from the pits to the kilns and storage areas 3 miles away. Production has been increased from 30 tons per hour to 180 tons per hour.

With the formerly-used method, clay was hauled in steel cars over a narrow gage railroad. This method required 25 men mining clay. It was time-consuming and it imposed severe limits on the amount of clay hauled and on the amount effectively used. The wet clay had a tendency to cling to the bottoms and sides of the steel cars. This required hand shoveling to unload the cars, otherwise they were returned to the pits with about one-third their load still inside.

With the new tramway system, the 180 tons per hour production rate requires only eight men. In 20 hr, enough clay can be hauled to supply the plant one week. Thus clay can be stored in good weather so that production of 225,000 bricks per day is kept at usual pace during bad or rainy weather.

The clay is mined with diesel engine equipment and

(*Continued on page* 135)

Meet
H. G. Barnett*

Westinghouse Electric Utility Engineering Department who would like to show, on the next few pages, how you can provide . . .

Better protection for your distribution investment

*"Barney" Barnett has worked in close cooperation with Utilities in every state of the nation. His wide experience has given him an intimate knowledge of every phase of power distribution. He and the product experts you will meet on the next few pages are a part of the Westinghouse team, available to help solve *your* specific problem.

"Since adequate protection starts at the substation, let's talk to Wally Payne, Unit Equipment Manager."

Substations with a future help protect your system investment

Westinghouse Coordinated Substations not only meet today's load demands, but provide the flexibility vital for future changes in load requirements. They are your first steps in assuring the greatest return and long-time usefulness from your substation investment.

First, let's consider the level of protection: The components of a Westinghouse Coordinated Substation are engineered to work and fit together from the design stage, through manufacturing. Addition of a feeder is a simple matter of adding the compact switchgear unit. A transformer can be changed out readily when necessary. The load capability of the coordinated substation can be readily adapted to accommodate load growth and shifting load centers. An entire substation can be moved easily, quickly, and economically with a minimum of temporary disturbances to service and without sacrifice of protection.

Then look into these installation savings: Lay a foundation, throat-connect cubicles to the transformer, and tie in your feeders. It's as simple as that. And it certainly contrasts with the time and labor costs involved in field-assembled equipment.

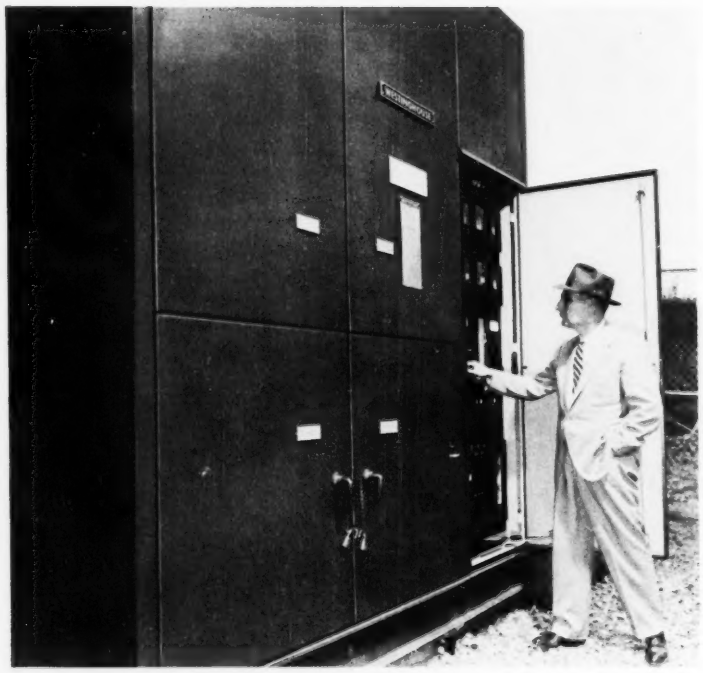
Booklet B-4061 will give further details on Westinghouse Coordinated Substations. Write for it. J-60811

YOU CAN BE **SURE**...IF IT'S

Drawout breaker design helps sustain better protection

First, it requires less maintenance. Second, essential maintenance is simplified.

Good workmen can do an even better job of maintenance with Westinghouse Drawout Breakers. The positive interlocking and accessibility of Westinghouse Metal-Clad Switchgear make it easy to interchange breakers in a few minutes with complete safety. Since the design takes full advantage of the "De-ion®" principle of arc quenching, maintenance of Westinghouse Breakers is reduced to a minimum.

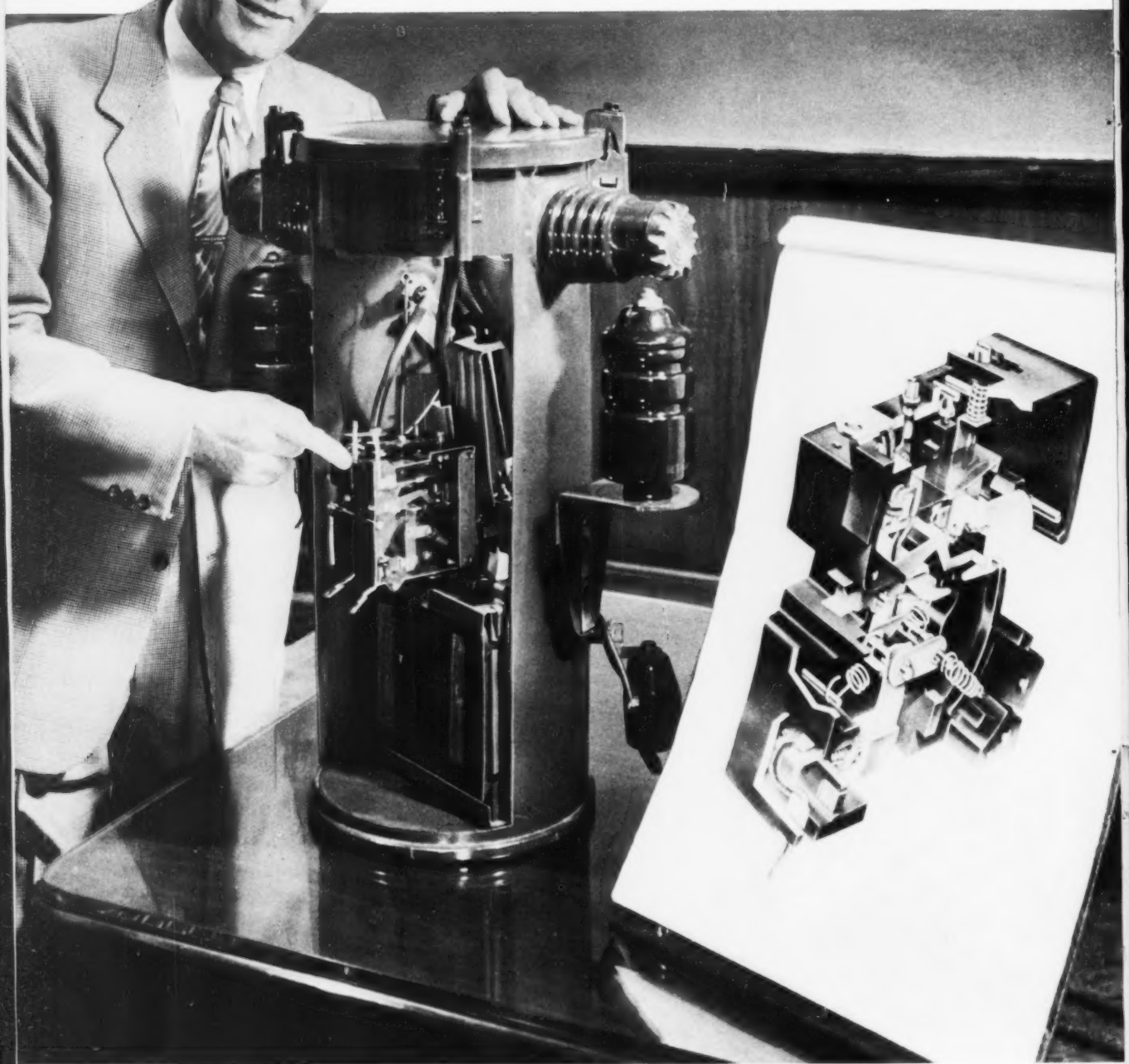


Get all these advantages in single-feeder substations, too

The Westinghouse "CSP" Power Transformer provides all the advantages of factory coordinated equipment for single-feeder stations, too. With complete metering, regulating, and protective equipment built into an integral unit with the transformer, its neatness and safety features lessen community objections to installation in residential areas. When installed with underground leads, even protective fencing may be eliminated.

Westinghouse

. . . "and now let's talk to Bob Rung of the Transformer Division about the latest in transformer protection:"



YOU CAN BE **SURE**... IF IT'S

Simplified design for "CSP" breaker...

improves on the best protection a transformer ever had

It's a completely new breaker, now available in Westinghouse "CSP®" and "CSPB®" Transformers, single and three phase.

As you know, more than 20 years of service have proved that the breakers in Westinghouse Transformers provide the most accurate overload protection available . . . direct response to copper temperature. The new Type "LR" breaker, based on this same principle, assures even greater dependability because it is a simplified design.

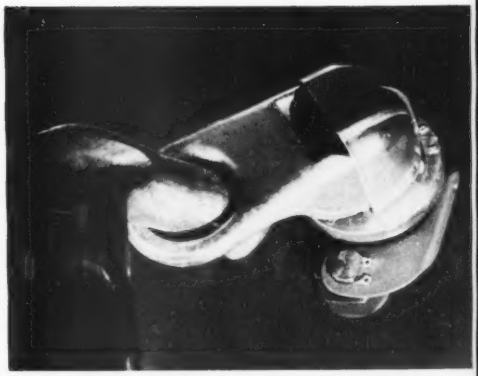
Fewer moving parts . . . just naturally add assurance of trouble-free service. *Increased contact pressure* . . . provides improved conductivity for unfailing performance. *New O-ring seal* . . . makes resetting easy as flipping a switch. *More compact, too* . . . most three-phase "CSP" and "CSPB" Transformers now fit into smaller tanks, substantially reducing both size and weight.

The new secondary breaker design is another reason why Westinghouse "CSP" (Completely Self-Protecting) Transformers provide better protection for your distribution investment. Not only does the breaker protect against overloads and short circuits, but also built-in arresters guard against lightning.

A copy of Technical Data 46-408 on the new "LR" breaker is available with full details.

J-70680

Continuous Load Check. A red warning light indicates a serious overload condition. This provides a continuous load check, making special load surveys unnecessary.

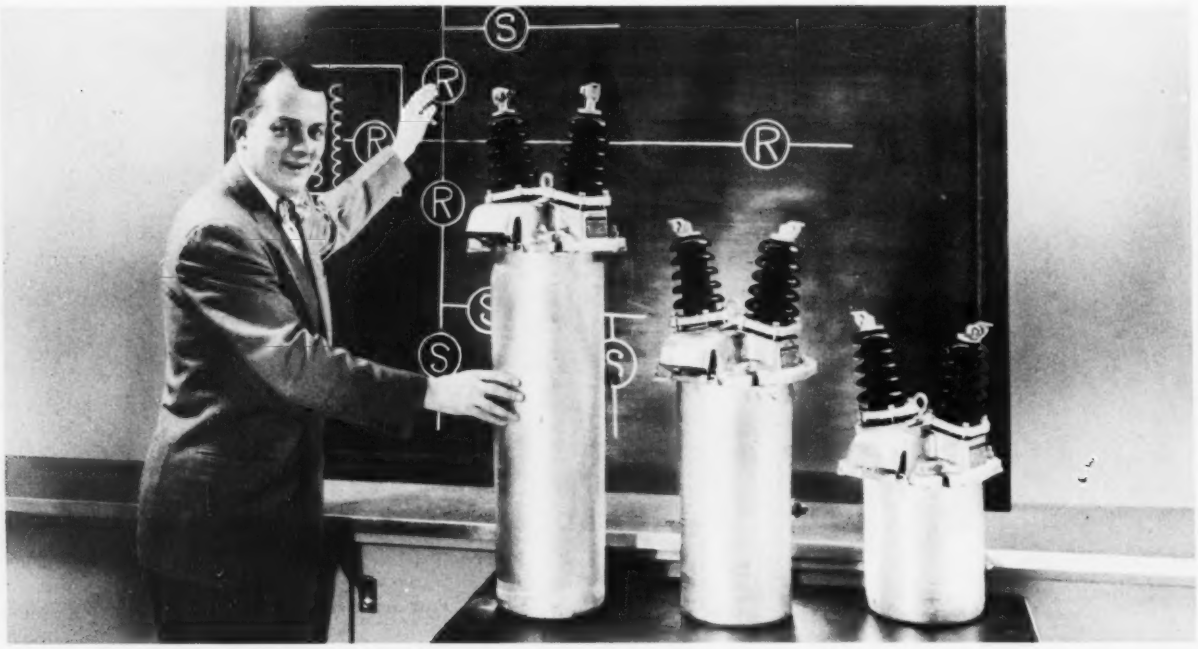


Burnout Protection. Dangerous overload trips breaker, preventing serious damage or burnout. Warning light remains on. If overload is temporary, and the crisis past, breaker may be reset with operating handle.

Emergency Service. When service must be maintained, in spite of dangerous overload, emergency control permits continued operation. Warning light remains on. Breaker still gives protection against short circuits.

Westinghouse

"Fred Reiber, Manager Switchgear Distribution Apparatus Sales, is the man to tell you about the protective advantages of reclosers and sectionalizers."



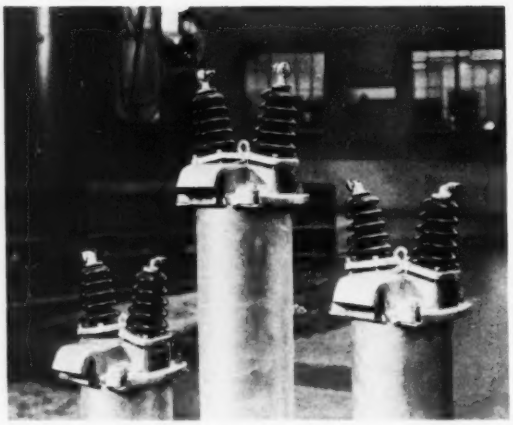
These Reclosers and Sectionalizers work better in new protective schemes because they're so simple

Here's a big opportunity for improving service and cutting service calls. We've helped innumerable utilities improve distribution systems by helping work out the most practical reclosing and sectionalizing schemes.

Westinghouse Reclosers and Sectionalizers work better in these coordinated automatic systems because they're inherently *simpler* than other types. The recloser operating mechanism has only 1/2 to 2/3 as many parts as others. The timing mechanism is hydraulic with no delicate relays, clocks or gears.

These devices are exceedingly *practical.* The recloser offers nine different combinations of instantaneous and time-delay settings. When reclosing after lockout, it operates on time delay, thus simplifying line pickup. And, if the fault persists, it locks out in *one* operation, not several.

The Westinghouse Sectionalizer is outstanding, too. Its momentary rating is 4000 amps, more than any other. Proper operation is insured by a magnetically compensated counting mechanism. Write for DB 38-680, DB 38-685, and DB 38-690 for more information on this superior equipment. J-60812



They're backed up by big-breaker engineering. Here reclosers undergo tests in the famous Westinghouse High Power Laboratory. We *know* they will perform right on the line.

YOU CAN BE **SURE**...IF IT'S

"To round out the Westinghouse story on protection, here's Relay Sales Manager, Frank Chapman."

New developments boost relay accuracy, improve protection

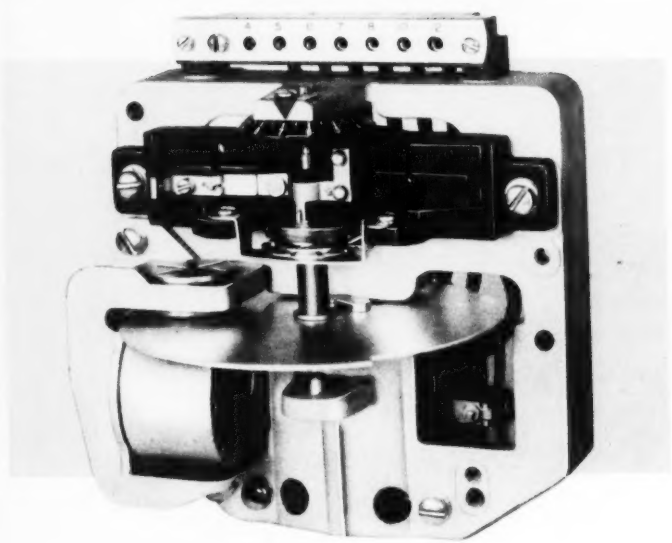
The new Westinghouse CO Relay enables you to match time curves much more accurately. This gives you faster, more precise relaying and a surer, safer switchgear operation.

The heart of this new relay is the "E" element. It has four separate and independent tolerance controls rather than the usual two. Thus, you can precisely adjust to the desired time curve without compromise. Three more factors contribute to high accuracy: low temperature error, low wave-form error, micrometer adjustment of the permanent magnet.

Just one of the factors that increase reliability of this new relay is a positive-action tap block with self-positioning taps. They provide a metal-to-metal contact between tap terminal and tap plate. In addition, the relay is built on a non-geared design with cast alnico magnet and one-piece, die-cast frame.

Write for booklet DB41-280 for complete details.

J-40441



Heart of the new relay is the "E" element which contributes to its greater accuracy.

Westinghouse

"Coordinated equipment means better protection . . . particularly when it's backed by a Westinghouse service like this!"

Westinghouse calls them Consulting and Application Engineers. They're my field counterparts, a highly trained group who devote full time to Utility problems and back up local application engineers. Here, for instance . . .

. . . is Stan Gaines (top right), C&A engineer who works out of the New York district office. Stan has had extensive experience with Utility distribution systems. He has made contributions to the design, application and operation of several lines of Westinghouse Distribution Equipment . . . most of which were made possible by close coordination with Utility organizations. Another good example is . . .

. . . Hank Madden (bottom right), a C&A engineer in our Southeastern District. Hank, like Stan Gaines, is a well-known authority on Utility problems. He holds several patents on his work with circuit breakers, transformers and sectionalizers.

C&A engineers can help you plan your distribution system for maximum savings in cost and adequate provision for future load requirements. Their intimate acquaintance with all phases of your activity and equipment enables them to assure you of optimum, long-term performance.

Fellows like Stan and Hank are strategically located in all sections of the country. They are available on a full-time basis to aid you in solving your problems . . . "on the spot." Don't fail to capitalize fully on their knowledge—backed by complete Westinghouse Engineering and Research.

Call your Westinghouse C & A engineer today for personalized C & A service—or specific equipment booklets. He'll give you prompt service. Or, if you prefer, write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. CP-1000

YOU CAN BE **SURE**...IF IT'S

Westinghouse

Aerial Tramway

(*Continued from page* 126)

dumped into a 10 cu yd capacity aluminum hopper. From this point the clay is loaded into 125-lb aluminum buckets. These buckets travel around the hopper on a steel rail. In the circle around the hopper is a weighing beam which loads each bucket with 2,000 lb of clay. When loaded, the bucket is automatically returned to a steel cable and it starts its journey back to the storage area 3 miles away.

The loaded buckets which ride on a steel cable 60 feet above the ground are spaced 160 ft apart. This cable, 15,520 ft long and 1⅜ in. in diameter, is stretched across 45 steel towers and crosses tree-covered land, roads and three lakes. It also crosses four 12-kv electric utility lines and passes under one 110-kv line. Special protection for the line crossing is provided by the use of mesh fence material, supported under the tramway towers.

Since it was not possible to construct the tramway in a straight line, two angle stations are used to turn the cable; 9 deg at one station, 17 deg at the other. The cable is spliced in only two places. Each splice is 120 ft long.

After a bucket has made the 3-mile trip from pits to storage area, it is transferred from the cable to a steel rail circling the unloading pit. Here the buckets are automatically tripped and their load spills into the storage area. They are then transferred again to the cable for their journey back to the pits. The total round-trip traveling time for each bucket is about one hour.

Tramway is powered by a 75-hp electric motor with an actual load of 60-hp. Special protective devices have been installed to give the alarm if any trouble develops on the system. By using a potentiometer and the wheatstone bridge principle, it is possible to locate the point of trouble quickly and with fairly good accuracy.

Order Filling Time Cut 50%

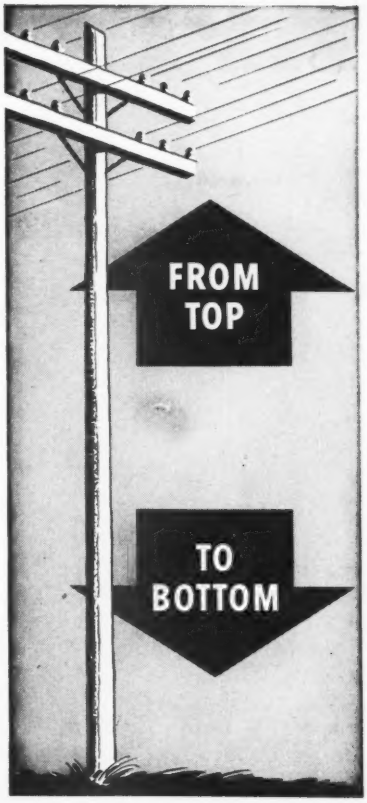
L. ALBERTSON, Application Engineer, Philadelphia Electric Co

Hardware orders are filled rapidly and efficiently at Supplee-Biddle-Steltz Co, Philadelphia, Pa., with use of a materials handling system consisting of a 1,000-ft chain driven by a 5-hp motor. Trucks used in filling orders are towed at a selected rate of speed ranging from 10 to 80 ft per min through aisles and around bins of hardware. Safety during operation is assured by six convenient switches at carefully planned locations which permit conveyor to be stopped at any time. It will stop automatically if overloaded.

Employees claim that it has helped them cut 50% off time previously required for completing an order, including routing, assembling, checking, packing, and chuting it to a truck-loading platform.

Trucks are towed one at a time or in tandem. Previously trucks were pushed manually and articles were collected in canvas baskets. In addition to saving time the new conveyor saves damage to the merchandise, frequent replacement of the canvas baskets, and other equipment maintenance. In addition to being used to fill orders, the conveyor also serves to restock bins with merchandise, saving additional time in the firm's operation.

MATERIALS HANDLING system using 1000-ft chain, tows trucks 10 to 80 ft per min, saves damage to merchandise and reduces time required to fill orders and restock bins



Penta gives CLEAN protection

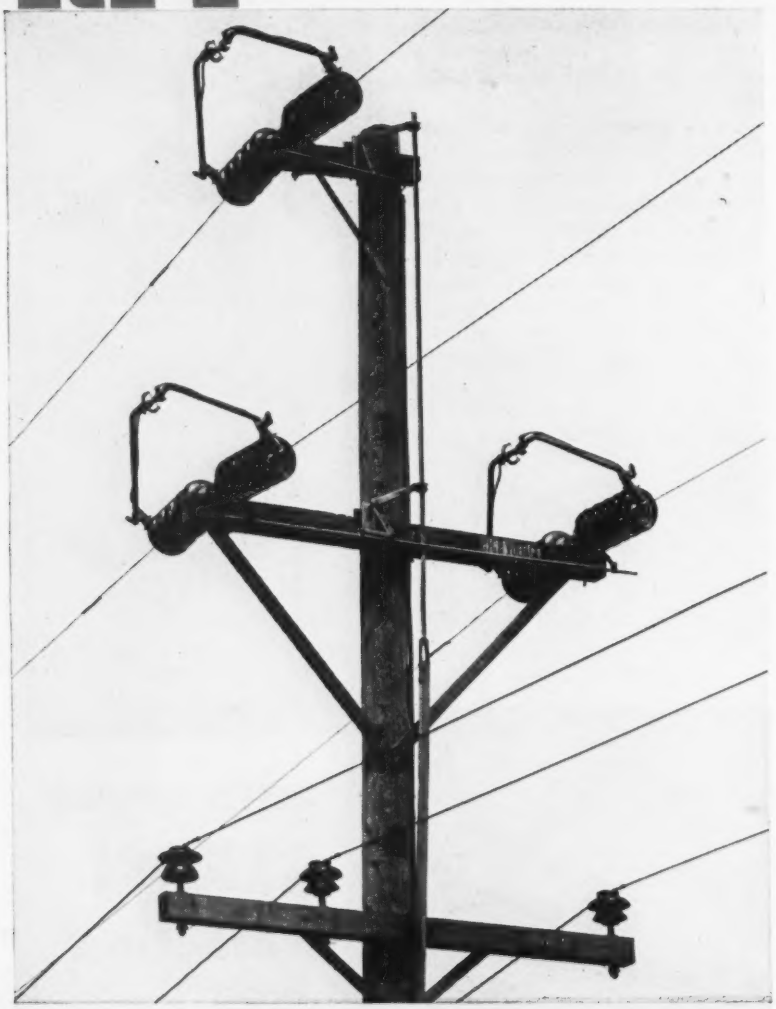
You'll find it's the PENTA-treated poles that last longer, stand stronger, stay *cleaner*. For PENTA is the clean way to safeguard poles, crossarms and other wood construction. PENTA is a chemical formula that's always the same—deep penetrating, powerful, long-lasting. PENTA-treated poles are protected from top rot, shell rot, insect damage, ground-line decay . . . last years longer, cost less to maintain . . . and they're *clean*. Write today for names of companies near you who supply PENTA-treated wood products.

CHAPMAN CHEMICAL COMPANY
Dermon Building, Memphis 3, Tenn.

CHAPMAN®

Penta Preservative

KPF **POLE TOP SWITCHES**



Simple design
means economical installation

Bore two holes in a single crossarm, tighten two bolts, attach the conductors, and the switch is installed! No separate dead-ends, no "extra" insulators required. Saves man hours, saves installation costs.

Simple design also means lower first cost, less maintenance. Insulator stacks are readily adjustable for line sag. Free-floating, self-aligning, silver-surfaced blades and jaws maintain proper contact under all conditions of sag adjustment. Switches can be used in vertical, horizontal or triangular mountings. The low-cost, trouble-free service rendered by KPF switches is attested by the many thousands in use throughout the world.

KPF ELECTRIC COMPANY
1624 E. Alpine Avenue • Stockton 5, Calif.

INDUSTRIAL BRIEFS

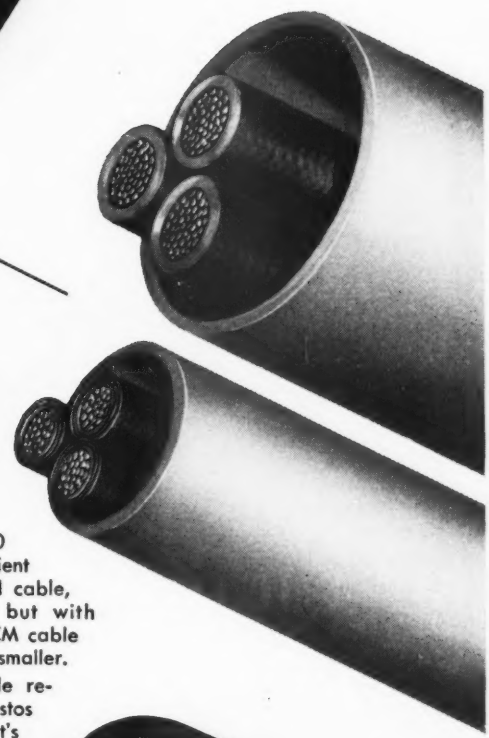
Electro-plating is aided by electric immersion heaters at Charles Audette Electro-Plating Co, Attleboro, Mass. Plating is more uniform, due to accuracy of temperature control. There is less loss of solution by evaporation. Plating room is cooler and operating cost is less. 30 lb steam was replaced by 21 kw of thermostatically controlled, tank immersion heaters with stainless steel sheaths. George B. Newton, Power Sales Eng, Attleboro Steam and Electric Co.

Heating paint with a 2-kw farm type stock tank heater at Cook's Welding Shop, Gomer, Ohio saves labor of 2 men and cost of paint spraying equipment. Production is speeded and paint job on steel TV towers is improved. Paint spraying required additional men and time in completing the product for sale. When the forms were dipped in aluminum paint, it was found that it would not adhere to the steel unless temperature of the paint was maintained at 70° F or above. Tank heater is thermostatically controlled. H. H. Barrick, Commercial Rep., Ohio Power Co, Lima, Ohio.

Heating molding patterns with electric strip heaters at Brenco, Inc, Petersburg, Va. produces 35% more castings with 30 less man-hours per day. This maker of railroad car journal bearings (which are brass castings averaging about 30 lb) had been heating molding patterns with acetylene and oil torches. Patterns were kept going until they cooled and then reheated. Now they're kept warm constantly with low-wattage strip heaters mounted in milled recesses under each pattern. Plant superintendent estimates that electric heat has increased output from 500 to 600 to 675 molds of two castings produced in one 8-hr day. Castings are better and of more uniform quality. Edwin L. Wiegand Co.

Hot water for wash rooms is assured by electric water heaters installed in these rooms at the point of need, at Metropolitan Brick, Inc. Royal Plant, Canton, Ohio. Plant office is some 200 yd distant from main plant buildings. A 1-gal electric water heater mounted below wash stand provides plenty of hot water for office staff of 4 men. G. W. Craiglow, Industrial Power Engineer, Ohio Power Co, Canton.

LOAD FOR LOAD!



ROCKBESTOS AVA

COSTS LESS INSTALLED

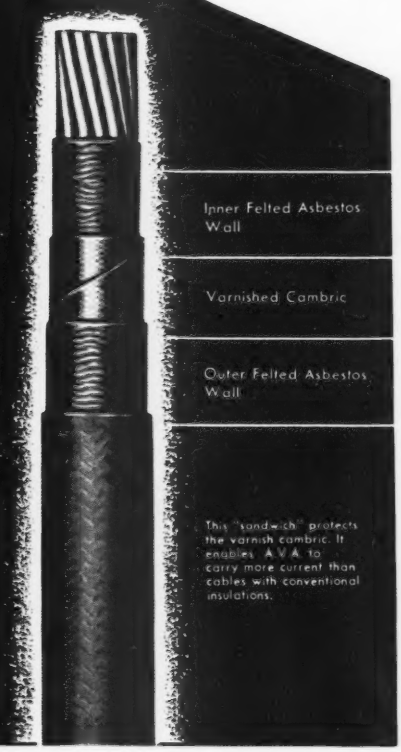
For example, take a 430 ampere load at 40°C Ambient temperature. To use type RH cable, an 800 MCM is required but with Rockbestos AVA, a size 500 MCM cable carries the same load and is 38% smaller.

Three 800 MCM type RH cable requires a 4" conduit, while with Rockbestos AVA, a 3" conduit does the job. What's more, the quicker, easier handling of lighter-weight Rockbestos AVA reduces labor costs substantially.

Compared size for size, Rockbestos AVA (AVC) helps you increase capacity simply by rewiring old conduits. No new larger conduit, fittings and accompanying labor are needed.

All because Rockbestos AVA (AVC) insulation's dielectric strength is *so well protected* it takes less to do the job . . . and assure maximum dependability through the years. Write for booklet "Cut Current Carrying Costs".

It's the A.V.C. "Sandwich" that makes the difference.


Inner Felted Asbestos Wall
Varnished Cambric
Outer Felted Asbestos Wall
This "sandwich" protects the varnish cambric. It enables A.V.A. to carry more current than cables with conventional insulations.

ROCKBESTOS PRODUCTS CORPORATION

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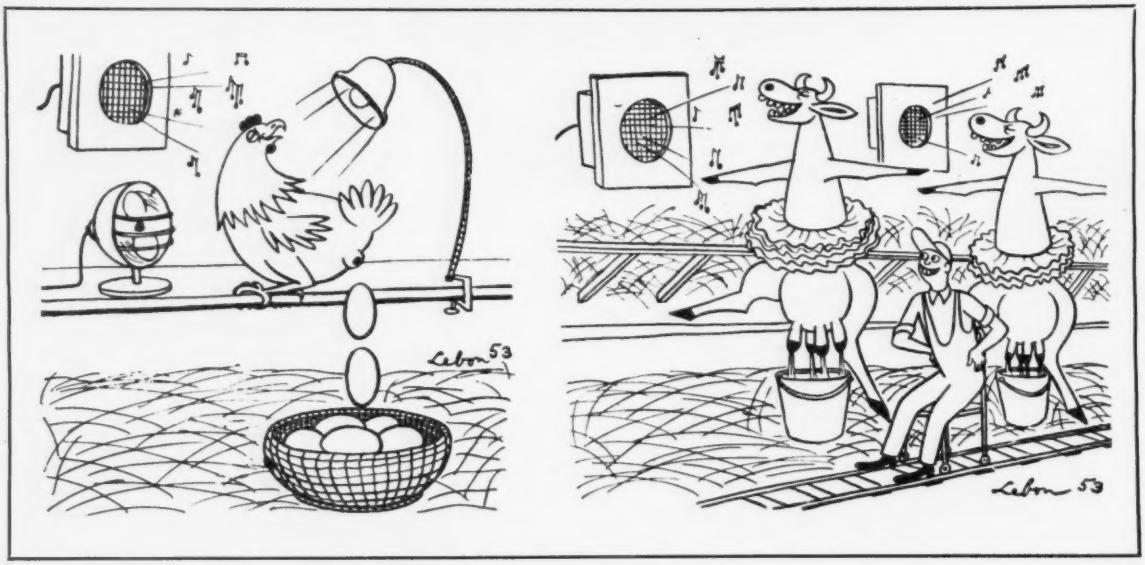
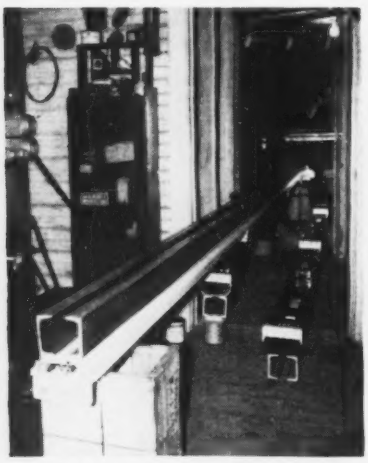
NEW YORK • CLEVELAND • DETROIT
CHICAGO • PITTSBURGH • ST. LOUIS
LOS ANGELES • NEW ORLEANS
OAKLAND, CALIFORNIA • SEATTLE

...Your best buy



An European Look at an American Electrified Farm

Published in "La Libre Belgique" a while ago was the report of a special correspondent who visited the "Electric Research Farm" near Madison, Wisconsin. Extracts from the report were reprinted in the French magazine, "Le Journal de l'Equipement Electrique," January 20, 1953, from which the sketches above are reproduced.



ASSEMBLY of these special fixtures in contractor's shop was preliminary to . . .

. . . INSTALLATION of new fluorescent lighting system with an average illumination of 40fc throughout the National Exchange Bank & Trust Co, Steubenville, Ohio.

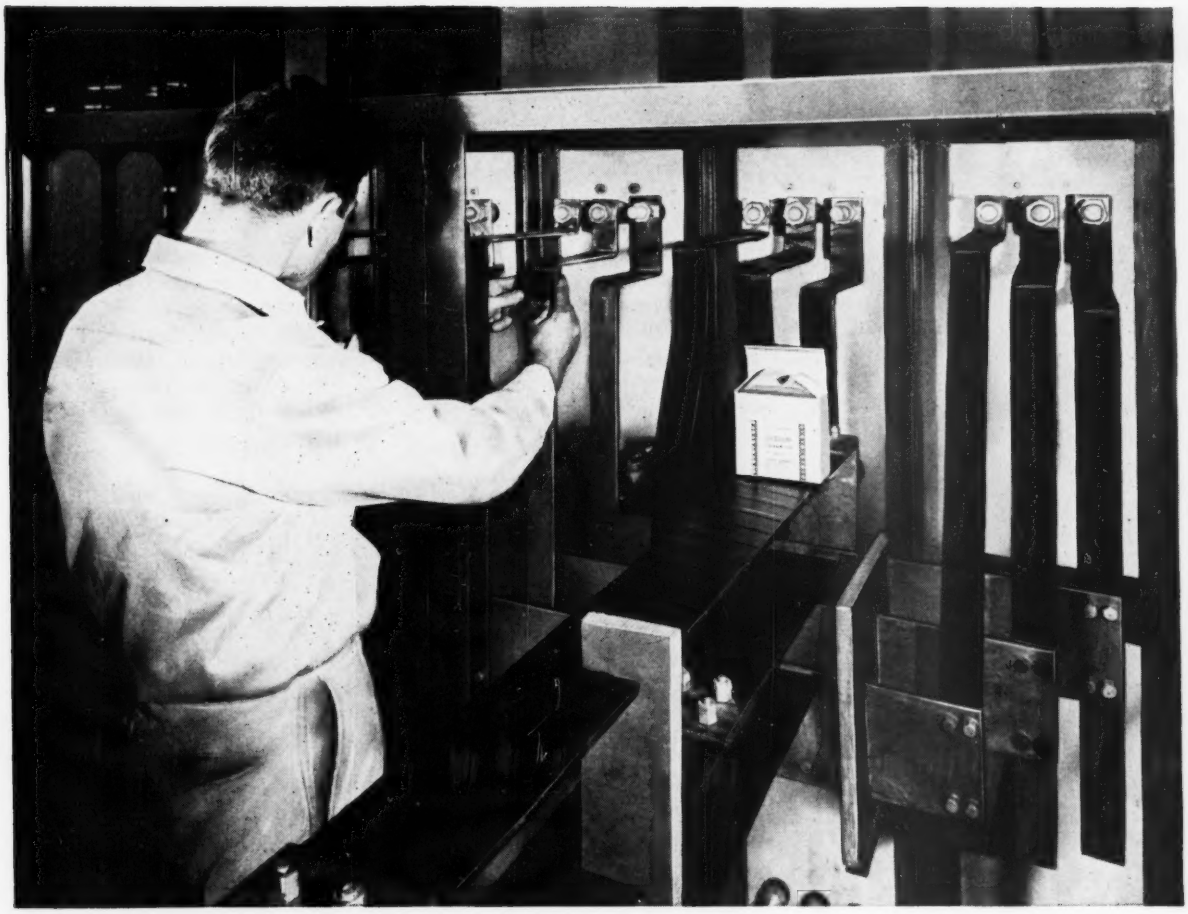
Filling a High Ceiling Area With Light

DONALD A. NAFTZGER, Industrial Power Engineer, Ohio Power Company

Mounting a modern fluorescent lighting system in a 25-foot high ceiling area requires considerable study from both an economic and architectural standpoint.

To meet such a problem at the National Exchange Bank & Trust Co, Steubenville, Ohio, our first thought was to install a recessed troffer system, since the 4-foot loft space above the suspended plaster ceiling would insure against interfering with room architecture. Bank fixture obstructions on the floor made this impractical for maintenance from below the ceiling; nor could it be easily maintained from above the ceiling because 48-inch solid I-beam girders impeded easy access to all sections of the loft. Then, too, it would have been unnecessarily expensive to install.

Our second thought of using stand-



How to wind up a big job quicker . . . neater . . . cheaper!

A single half-lapped layer of "Scotch" Plastic Electrical Tape is all you need for results like this! Think how much tape you save. Think how much *time* you save. Yet plastic tape does *more* than save you money.

It gives you *dependable* protection. The plastic backing resists acids, oils, alcohols—even abrasion and weathering.

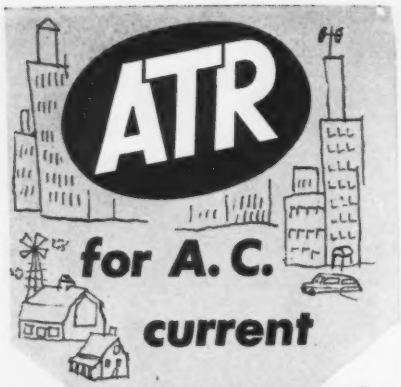
And what a man-sized job it does for the little space it takes! In the 7 mil thickness—"Scotch" 33—it has a dielectric strength of 10,000 volts. The 10 mil thick tape—"Scotch" 22—gives equal electrical protection with extra abrasion resistance.

Try it today and see! See how it conforms to angles and odd-shaped fixtures. See how it sticks tight—leaves no gaps or voids, no "open doors" to trouble.

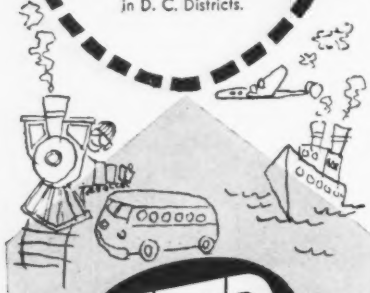
Your supplier has this remarkable tape in stock. Put it on your "want list" now!

3M COMPANY

The term "Scotch" and the plaid design are registered trademarks for the more than 200 pressure-sensitive adhesive tapes made in U.S.A. by **Minnesota Mining & Mfg. Co., St. Paul 6, Minn.**—also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Nonslip Surfacing, "3M" Abrasives, "3M" Adhesives. General Export: 122 E. 42nd St., New York 17, N. Y. In Canada: London, Ont., Can.



STANDARD and HEAVY DUTY
INVERTERS
For Inverting D. C. to A. C. . . . Specially Designed for operating A. C. Radios, Television Sets, Amplifiers, Address Systems, and Radio Test Equipment from D. C. Voltages in Vehicles, Ships, Trains, Planes and in D. C. Districts.



ATR

✓ NEW MODELS
✓ NEW DESIGNS
✓ NEW LITERATURE

"A" Battery Eliminators, DC-AC Inverters, Auto Radio Vibrators

See your jobber or write factory

AMERICAN TELEVISION & RADIO CO.
Quality Products Since 1931
SAINT PAUL 1, MINNESOTA—U. S. A.

ard stem suspension for the four rows of 96-inch fixtures mounted 15 feet above the floor was discouraging because of the hail-storm effect of so many stems (9 or 11 per row), which again would clash with the architecture.

This was solved by using 4″ x 2″ x ½″ aluminum alloy channels, to form fixture mounts, supported by 10′ ¾″ conduit stems on 20 foot spacings. Conduit stems were covered with 1½″ fluted aluminum tubing with an aluminum canopy at the ceiling.

Mounting bar was made in two sections bolted together by tie plates, with channels spaced one inch apart permitting attachment of the conduit to an adjustable steel bearing plate between the channel webs. Design was for a fixture weight of 12 pounds per foot.

Four rows of three lamp, 425 m.a., 96″ semi-direct fluorescent units, equipped with polystyrene diffusing lens covers, produce 40 fc, contrasting with 5 fc produced by the chandeliers used previously.

Details of the installation were worked out by the author, Swan-Bower Co, local electric supplier, and Aluminum Co of America engineers.

Chick brooder was this home freezer in which 20F was maintained. An infrared lamp provided direct heat to the chicks on the compartment floor while ice formed on the inside walls

Home Freezer Broods Chicks at 20 F

WILLIAM KOLLMAYR, Farm Service Director, New Jersey Power & Light Co, Dover, N. J.

How chicks can be raised in a home freezer as well as in a brooding house and be above average in weight and size for their age, was demonstrated at two county fairs. Accompanying illustration shows the exhibit.

This method was made feasible by the direct radiant heat transfer from a 250-w clear-bulb infrared lamp to the chicks while in a maintained ambient air temperature of 20 F.

A total of 25 one-day old chicks were placed in a 15 cu ft freezer The infrared lamp was suspended 10 in. from the bottom, just high enough so that the reflected heat did not strike the side walls. Other conditions were equal for brooding. Wood shavings were used on the freezer floor. Water was placed partially under the lamp to prevent freezing. Food trough was in the cold area to provide exercise. In addition a couple of ice cubes were placed in a far corner, and, not melting, indicated the cold temperature.

Space occupied by the brood was approximately 19 in. wide by 27-in. long by 30 in. deep. Chicks usually stayed on fringe of heat pattern. Frequently the chicks ate the frost on the side of the freezer. Since the lamp rays (due to the reflector) were directed to the compartment bottom, 2 in. of ice formed on the inside freezer walls after 7 days in an exhibit.

When the day-old chicks were placed in the freezer they remained

Wagner

Form W

Core and Coil Assemblies

You can renew or up-rate your old or burned out transformers with brand new Wagner Form W core and coil assemblies, exactly like those used in new Wagner Transformers. It's easy—too, Wagner assemblies come to you complete with terminal board or tap changer, with leads ready to install in your tank. Universal mounting brackets are furnished with each unit to make the installation a simple job. Wagner assemblies have passed complete factory tests—are fully dried—and are then packed in Wagner transformer oil, which you may also use in your tank.

Renew the life of old transformers!

Form W core and coil assemblies are shipped to you in sealed containers—ready to install without further testing or drying. Each assembly has a new serial number and name plate. In addition to factory-new core and coil assemblies, Wagner also can furnish bushing assemblies as described below.

High Voltage Bushing Assemblies

Available in cover-mounted or tank wall mounted types to meet a wide range of requirements. Gasket, solderless connector-type terminal and clamping device are included—fuses can be furnished when specified.

Low Voltage Bushing Assembly

Ready to install — includes porcelain bushing, gasket, solderless connector-type terminal and clamping device.

Complete Factory Rebuilding Service

Including thorough cleaning and repainting, installation of new coils and insulation, all new gaskets, and a factory inspection. Guaranteed against defective material or workmanship for one year. If complete rebuilding is not necessary, repairs are made on a time and material basis. Write for Transformer Repair Schedule TU-88A.

Field Repair Service for Substation Transformers

Wagner's Transformer Service Trucks — completely equipped for field repairs . . . each with the services of an expert—are available on schedule in certain localities. The cost of this exclusive Wagner service is nominal—write for information.

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6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

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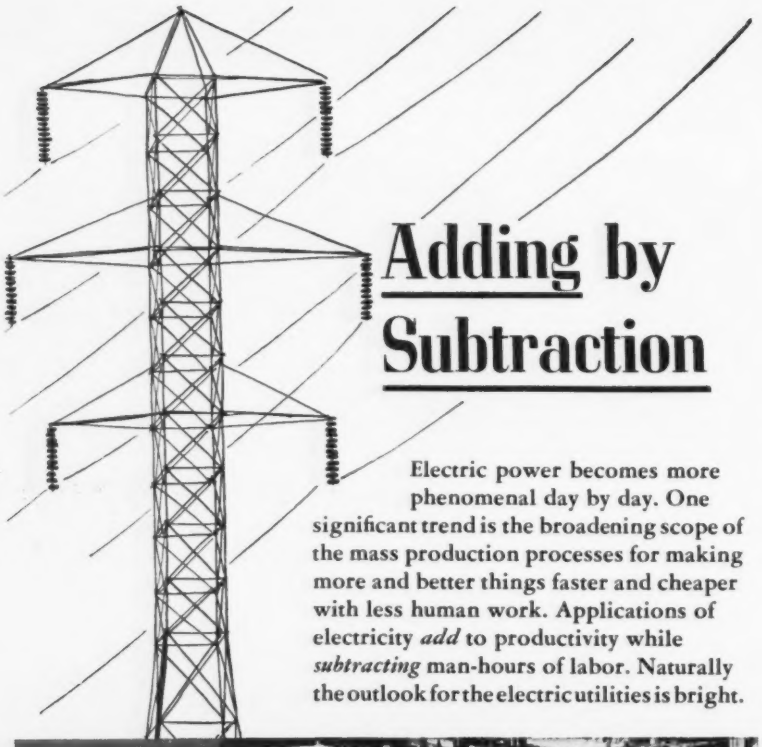
ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

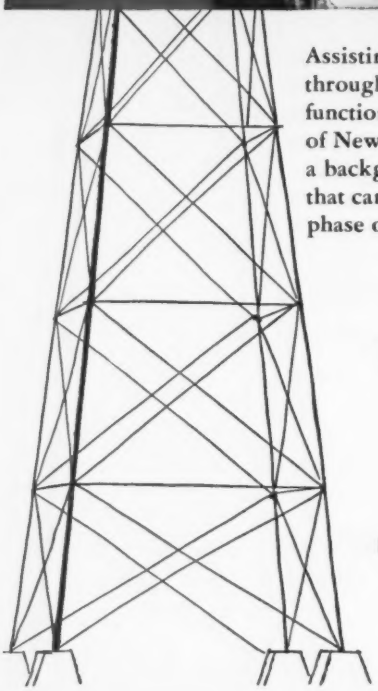
TS52-1



Adding by Subtraction

Electric power becomes more phenomenal day by day. One significant trend is the broadening scope of the mass production processes for making more and better things faster and cheaper with less human work. Applications of electricity *add* to productivity while *subtracting* man-hours of labor. Naturally the outlook for the electric utilities is bright.

Electricity moves washing machines along this plant assembly line . . . will later power them in homes all over the country.



Assisting the public utilities to grow, through sound financing, is an important function of Guaranty Trust Company of New York. From this experience stems a background of specialized knowledge that can be of real service in any financial phase of the industry's growth.

Guaranty Trust Company of New York

Capital Funds $380,000,000

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Fifth Ave. at 44th St. New York 36 — Madison Ave. at 60th St. New York 21

Rockefeller Plaza at 50th St. New York 20

LONDON PARIS BRUSSELS

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there continuously for two weeks and were exhibited at two fairs. All the chicks were well developed and no heat was needed after their removal from the home freezer.

Working Wife Buys Like Homebody, Survey Shows

Though thinking that the appliances she lacks would simplify her life, the average working housewife has no more desire to buy them than does the stay-at-home housewife. This is one of the findings of an exhaustive analysis on "The Homemaking Habits of the Working Wife" made by the Major and Small Appliance Divisions of the General Electric Co.

As a matter of fact, neither woman makes important use of modern automatic equipment, workers from the Ross Federal Research Corp found in their survey of 700 working wives and 250 full-time housewives. The typical wife, however, owns a range, water heater, refrigerator, washing machine, vacuum cleaner, iron, toaster, mixer, waffle iron, and sewing machine.

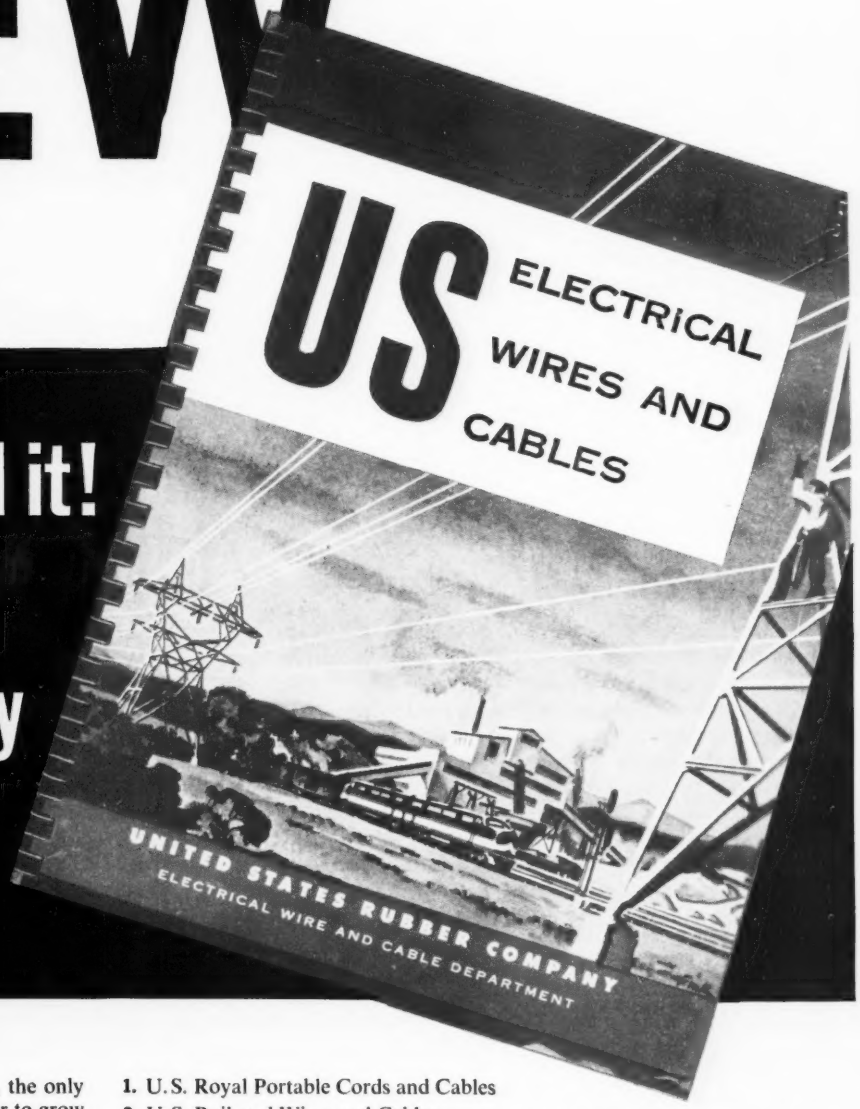
Both types of wives rate the automatic washer as the "most useful appliance not now in the home" and think that the ironer and dryer would be next most useful.

Room Air Conditioners Need Adequate Wiring

The rapidly-expanding room air conditioner industry has its share of growing pains. One of the most apparent is caused by buyers "plugging in" the unit on circuits already overloaded by other appliances or otherwise inadequate to deliver the needed power. The industry is planning to minimize that difficulty in 1953 through dealer education on proper installation, with particular emphasis on the need for adequate wiring.

The first step in the dealer-education program is a pamphlet, "Room Air Conditioners are Plug-in Appliances, But. . . .," prepared by the Air Conditioning and Refrigerating Machinery Association, Washington, D. C. With brief text and in cartoon-style illustrations, the pamphlet outlines the "why" and "how" of adequate wiring for room air conditioners and stresses the need for the dealer to work closely with local power companies and civic authorities.

NEW



You need it! Send for free copy today!

United States Rubber Company, the only electrical wire and cable producer to grow its own natural rubber and to manufacture its own plastics and synthetic rubber, makes a complete line of electrical wires and cables for every industrial and domestic application. Just published is the 1953 "U.S." Catalog, essential for men who specify, install or maintain electrical wire and cable. Send for your free copy to address below. Here are the catalog chapter headings:

1. U.S. Royal Portable Cords and Cables
2. U.S. Railroad Wires and Cables
3. U.S. Power Cables
4. U.S. Control and Signal Cables
5. U.S. Building Wires and Cables
6. U.S. Bare and Weatherproof Wires
7. U.S. Flexible Cords and Cord Sets
8. U.S. Telephone Wires and Cables
9. Miscellaneous U.S. Wires and Cables
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"U.S." Research perfects it...

"U.S." Production builds it

U.S. RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

ELECTRICAL WIRE AND CABLE DEPARTMENT • Rockefeller Center, New York 20, N.Y.

NEW EQUIPMENT

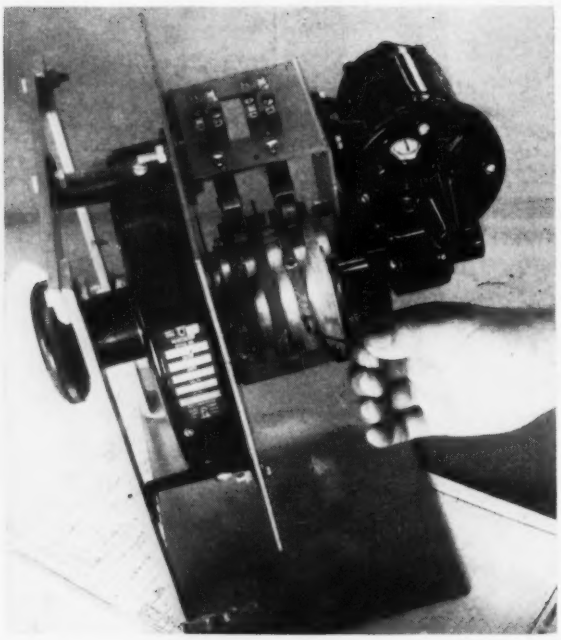
Air Switch

Designed for use at corner turns or straight through applications. It is mounted directly to the pole, eliminating cross arms or special structures.

All contacts are silver to copper and are self-aligning—no copper braid shunts are used. The switch design allows 90 deg deadending to the base and the vertical erection configuration provides 270 deg of free climbing space, it is claimed.

The switches are available in 15, 23, 34.5, 46 and 69 kv ratings, all at 600 amp. Claimed to successfully break the charging current of 60 miles of 69-kv line.

W. N. Matthews Corp, St. Louis 16, Mo.



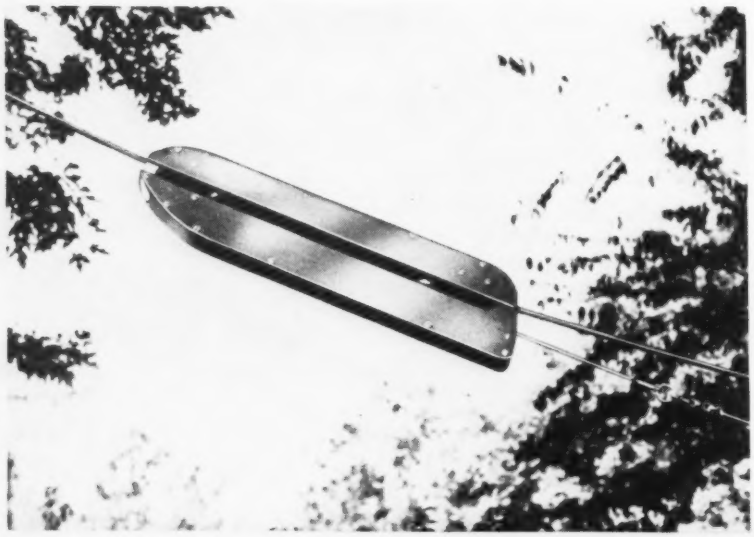
Field Rheostat

With motor drive is used to adjust speed of dc motors up to 200 hp and voltage of generators up to 300 kw.

Called Type RK, this rheostat uses snap-action limit switches. Two cam-operated switches are supplied with each unit with additional switches available for auxiliary circuits. Cams are adjustable, and are available for 15-, 45- and 90-deg travel.

Two different gear ratios can be supplied; one permits full rheostat travel in from 5 to 15 sec; the other permits full travel in 15 to 45 sec. The time can be adjusted over a 3 to 1 range by inserting resistance in the motor circuit.

Westinghouse Electric Corp, Pittsburgh 30, Pa.



Wire Creeper

Enables linemen to string additional wire through trees, over buildings, across ravines and other troublesome areas quickly and easily, wherever one wire is already in place. The creeper is attached to a wire; by pulling and releasing the plastic cord fastened to it, the operator moves the creeper along the wire in 10- to 20-ft leaps.

Line splices, frayed insulation, steep inclines, twigs and foliage present no problem to the creeper, although trees slow the operation slightly, it is claimed. Its operating speed is fast, aiding restoration of lines during emergencies and normal stringing work.

Martindale Electric Co, Cleveland 7, Ohio

Get a line on the HUB-RAK

HUB-RAKS are designed for easy installation, easy "pulling-in" of the lines, and easy replacement of broken insulators. HUB-RAKS are pressed from heavy steel, with channel shaped back that gives extra strength. The points are firmly riveted and perfectly aligned for easy insertion of the rack bolts. Mounting slots are conveniently located to provide a wide choice of mounting bolt location. Finest quality, smoothly finished insulators protect conductors from damage.

The HUB-RAK is made in Line Type with extended and non-extended back, and in Service Type with extended back only. It is made for one, two, three or four wires, with line spacing from four to twelve inches. HUB-RAK users from coast to coast over a period of many years have established its reputation as "the finest rack ever produced."

HUBBARD AND COMPANY

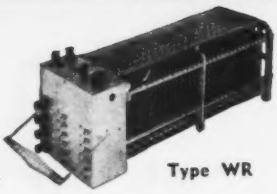
ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the Load on Hubbard Hardware!"

THE STATES COMPANY

feature
a complete line
of the latest in
RELAY TESTING EQUIPMENT



Type WR

Made in two sizes:
60 amperes, 120 volts
50-25 amperes, 120-240 volts

Ohm-spun
Resistance Loads

Superior for Relay Testing
Long Life, Low Cost

Controls either alternating or direct current free from distortion of wave due to inductance. Provides a light and convenient load with units designed for long life.

TRANSFORMER TYPE
RELAY LOADS

Type VS

Type VS loads provide heavy testing current with minimum wattage. The secondary current control has a fine adjustment up through 90 amperes.

Clip Off and Mail Today to

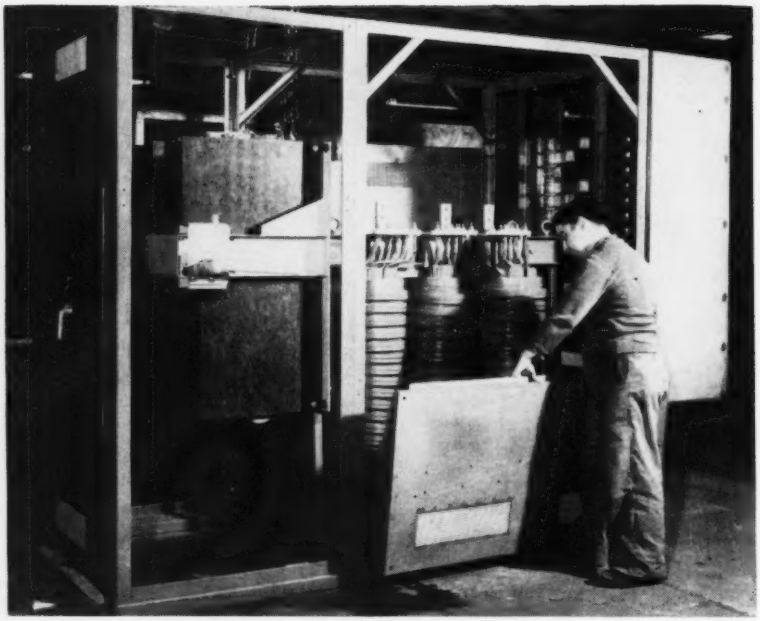
The States Company
3 New Park Ave., Hartford, Conn.

Please mail Relay Testing Cat. No. 5, Sec. 10 to:

Name ..... Title.....

Firm .....

City .....Zone...State.....



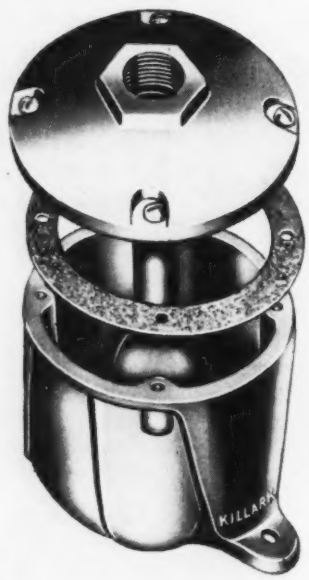
Air Cooled Transformers

Available in ranges from 1 to 3,000 kva up to 15,000 v. The air cooled transformers are designed with a combination of Mylar and Quinterra or Dacron on insulated magnet wire.

Tests on the new insulation are said to have high heat resistance and to increase dielectric strength 10 times above industry standards. Failures at such points as between turns and layers have virtually been eliminated, it is claimed.

Additional protection is achieved in the transformers using Quinglass, a layer insulation possessing high physical strength.

Marcus Transformer Co, Hillside, N. J.



Vapor-Tight Box

Series VLJ are 4-in. in diameter with models from 1⅝ to 3½-in. deep to provide ample wiring space. Each can be furnished with a blank or hub cover, or can be supplied with an adapter plate designed for light attachments. The boxes are also designed from sturdy, light weight and non-rusting Alumalloy, and will take up to 1-in. conduit sizes, it is said.

Killark Electric Manufacturing Co, St. Louis, Mo.

Have you a fly ash recovery problem?

Bring it to WESTERN PRECIPITATION

. . . The Only Organization With Years Of "Know-How" In BOTH *Electrical* And *Mechanical* Recovery Methods!

If you have any kind of a suspension-recovery problem—whether dust, fly ash, fume, fog or mists—it will pay you to bring it to the leading organization in the field . . . WESTERN PRECIPITATION CORPORATION. Western Precipitation not only pioneered, over 44 years ago, the first commercial application of the now-famous COTTRELL Electrical Precipitators, but also has been a leader for many years in the *mechanical* recovery field with its widely-accepted MULTICLONE Collectors.

Result:

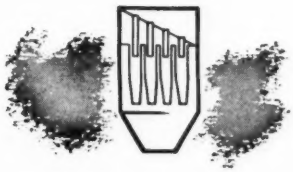
Western Precipitation is unsurpassed in the all-important factor of "know-how" in BOTH the electrical and mechanical fields . . . knows from years of first-hand experience whether your particular problem can best be solved by mechanical or electrical methods—*or by a combination of the two* . . . can give you a direct and unbiased recommendation on the matter . . . and then can provide the complete installation under *one* responsibility, *one* overall performance guarantee, even where Combination Multiclone-Precipitator (CMP) installations are made!

Western Precipitation products and services include . . .

COTTRELL

Electrical Precipitators

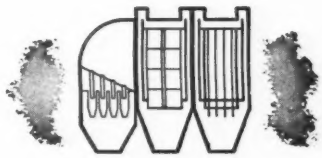
. . . the most efficient recovery equipment for high recovery, long life, low maintenance on practically any type of suspensions, wet or dry. COTTRELLS can be designed to handle a few c.f.m. —or millions—with equal ease, and at virtually any operating temperature. Recovery efficiencies closely approach 100% recovery, if desired, with very low draft loss, minimum power costs and negligible labor costs. *By all standards, Western Precipitation* COTTRELLS *give highest recovery at lowest cost per-year-of-service!*



MULTICLONE

Mechanical Collectors

. . . the most efficient, most compact, most trouble-free mechanical equipment for recovering suspensions from gases. Because of their unique small-tube design, MULTICLONES are unsurpassed in mechanical recovery efficiencies—require less space, less maintenance, and are far simpler to install. No filters or screens to replace, nothing to burn or cause fire hazards, no high speed moving parts to repair or replace. These and many other advantages make MULTICLONE Collectors the logical choice on installations where mechanical recovery is selected.



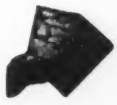
CMP UNITS

(Combination Multiclone-Precipitator)

. . . combine, in *one* compact installation, *both* mechanical and electrical recovery principles so that maximum benefit is obtained from the advantages inherent in each method. The MULTICLONE section centrifugally removes the larger and heavier suspensions (down to a few microns in diameter) . . . and the COTTRELL section then electrically removes the very small particles remaining in the gases. Thus, the bulk of the recovery is obtained with relatively low-cost equipment, and the final clean-up is obtained with equipment having unusually high recovery efficiency—approaching theoretically perfect, if desired.

The recovery of suspensions from gases is a highly exact science and every problem is different. Some require mechanical methods—others electrical methods—still others a combination of mechanical and electrical methods in proper balance to meet the individual requirements of each application. No matter what your problem, remember that only Western Precipitation has had years of field experience in BOTH mechanical and electrical methods!

Send for descriptive literature!



Let our experienced engineers study your recovery requirements and make an unbiased recommendation on the equipment best suited to your particular problem. A wire, phone call or letter to our nearest office places this unique "know-how" at your service, without obligation.

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ENGINEERS, DESIGNERS & MANUFACTURERS OF EQUIPMENT FOR COLLECTION OF SUSPENDED MATERIALS FROM GASES & LIQUIDS

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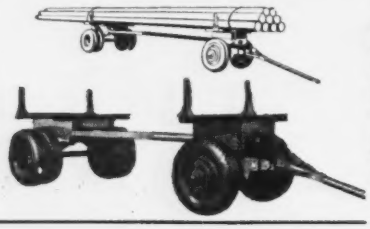
MULTICLONE—T.M. Reg.

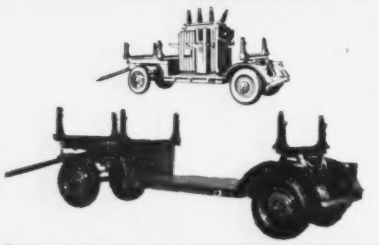
Notes on Eagle Equipment — Designed to save man-hours and money

TRAILERS

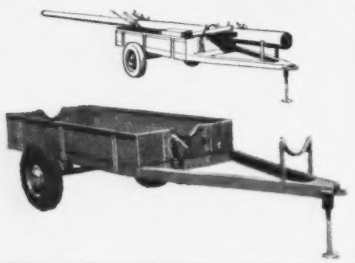
...IN A WIDE RANGE OF SIZES AND TYPES



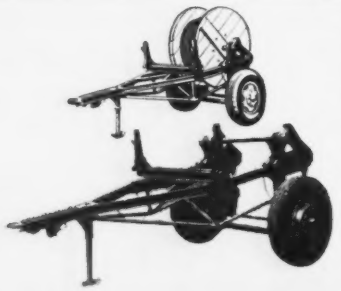
ADJUSTABLE LENGTH POLE TRAILER: easily adjusts to accommodate poles up to 90 ft. long — a big trailer that does a big job. Center pole telescopes. Trails smoothly. Equipped with electric brakes on rear wheels. Get complete information on Eagle Trailer Model 6450.



FOUR-WHEEL LO-BED TRAILER: for easy loading and hauling of heavy bulky units, also suited to pole and general purpose hauling. Five ton capacity, overall length 25 ft. 8 inches. Distance ground to low platform only 25½ inches. Equipped with electric brakes on rear wheels. Get complete information on Eagle Trailer Model 6441.



LIGHT-DUTY CARGO AND GENERAL PURPOSE TRAILER: light-duty, 1-ton capacity trailer for hauling one or two poles, cross-arms, pole hardware, etc. Has pole saddles front and rear and removable end boards. Get complete information on Eagle Trailer Model 7163.



COMBINATION CABLE REEL AND POLE TRAILER: complete with bolsters, stanchions, cable reel saddles. Quickly converted into a pole trailer by removing cable reel saddles and installing bolsters. A practical dual purpose unit, requiring only one trailer license. Get complete information on Eagle Trailer PCP — W-PCP series.

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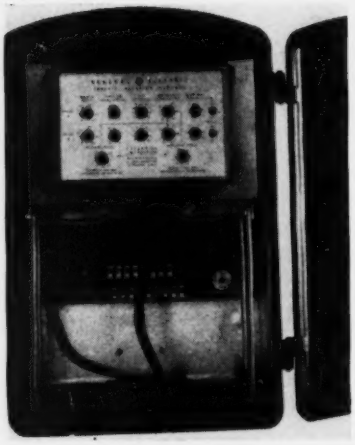
Division of The Four Wheel Drive Auto Co.



Traffic Controllers

Capable of detecting intersection traffic flow and allocating the right-of-way to streets according to relative volumes. One controller, type V, employs an electronic timing circuit. The type W controller has an electromechanical mechanism.

In a typical installation, vehicle detectors, placed in intersection approaches, evaluate traffic flow and relays signals to a controller. A signal-timer interpolates the signals and allocates the right-of-way.

General Electric Co, Schenectady 5, N. Y.

Utility Trucks

Model R-170, with 130-, 142-, 154- and 172-in. wheelbases, have special public utility bodies. Gross vehicle weight ratings range from 16,000 to 19,500 lb.

R-170's powerplant is the 100-hp Super Blue Diamond engine. It is available with either a gasoline or LPG fuel system.

This is one of 168 basic chassis models in 296 wheelbases offered in the R-line. The line is claimed to offer 307 new features.

International Harvester Co, Chicago 1

YOUR SWITCH and BUS INSULATORS WILL NEVER HAVE TO TAKE THIS PUNISHMENT

. . . but they can if they're made of

VICTOR PURIFIED PORCELAIN

Left: Victor No. 729 Stacking Unit undergoing cantilever test to determine ultimate strength.

It's pretty satisfying to know that the insulators on your system can take more punishment than they'll ever get in service. That's why more and more power men specify Victor *Purified Porcelain* insulators. Laboratory tests show they have unequalled cantilever, torsion, tension, and compression strength, perfection of glaze and durability under all service conditions. For complete engineering data, send for Bulletin No. 5.

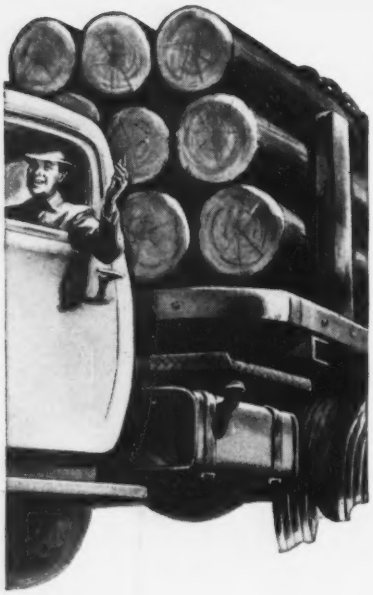
VICTOR NO. 742 (NEMA TR-NO. 7) SWITCH and BUS INSULATOR

FREE BOOKLET gives you the full story on how Victor insulators are made—how and why *Purified Porcelain* was developed. Write us for your copy.

Specify VICTOR INSULATORS!

VICTOR INSULATORS, INC., VICTOR, N. Y.

Low and High Voltage Pintypes • Suspensions • Guy Strains • Spools • Switch and Bus Insulators • Custom Designed Porcelain



Another Load of:

Haley's

CEDAR POLES

and

FIR CROSS ARMS

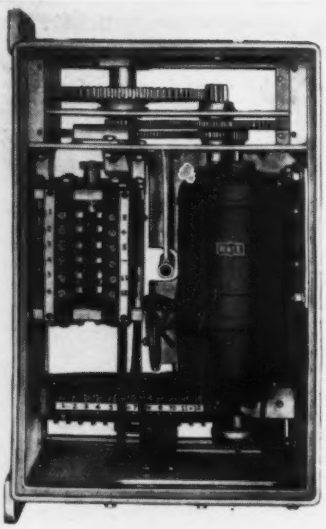
Light in weight and clean. PENTAchlorophenol treated in our modern plant for protection against decay, moisture and insect damage.

TWO strategically located yards:

MINNEAPOLIS, MINNESOTA

FINDLAY, OHIO

R. G. HALEY & CO.
SPITZER BLDG.
TOLEDO 4, OHIO



Switch Motor

Called MO-9, has an integral brake, for operating air switches. It can replace R&IE units now in use with slight housing modifications.

The actuating motion is torsional, but provision is made for reciprocating switch linkages. MO-9 maintains required torque throughout its operation and is claimed to be highly reliable for controlled operation of a switch.

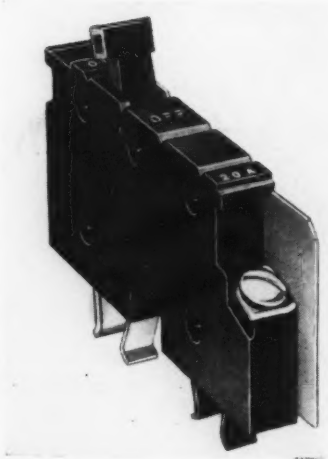
Mechanism parts are easily accessible for inspection and maintenance. Covers can be quickly removed and can be padlocked closed.

R & IE Equipment Division, ITE Circuit Breaker Co, Greensburg, Pa.

Flag Standard

Features Y-type flag holder for two flags at eye level to drivers; upright of standard steel pipe fittings with hole for fusee flare; sturdy round base, which won't tip; if standard is hit, upright shears off at base; yellow paint for high visibility; breaks down readily for packing in small canvas bag.

Charleston Rubber Co, Charleston, S. C.

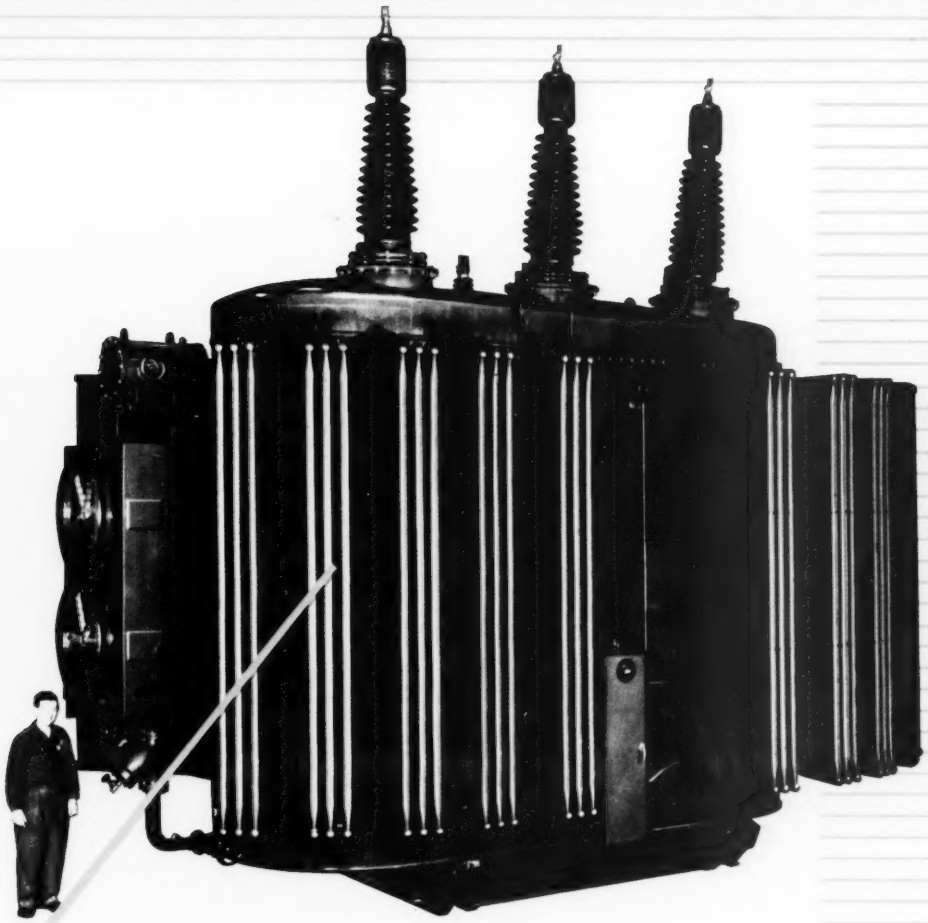


Circuit Breaker

Rated at 15 to 50 amp in single-pole, for lower capacity and double-pole construction, for 30 amp and up, are called XO and used for general purpose loads.

Operating features claimed include: quick make and quick break, positive operation, automatic relatching that eliminates complicated restoration of service, ambient compensation to prevent nuisance tripping, shock resistance, plug-in mounting, and thermal-magnetic protection for both moderate and extremely heavy loads.

The complete XO load center line, covering a range of from one to 32



58,000 Kva *Three Phase*
Pennsylvania Power Transformer

With its two forced-oil — forced-air heat exchangers in operation, this triple-rated Pennsylvania power transformer is capable of delivering 58,000 Kva. When one heat exchanger is in operation, the rating is lowered to 46,400 Kva. When the transformer operates without heat exchangers, it has a rating of 34,800 Kva. The unit is designed to step down a transmission voltage of 161,000 volts to 13,200 volts.

Pennsylvania Transformer Company

A McGraw Electric Company Division

Canonsburg, Pennsylvania • *Greater Pittsburgh District*

SEE NEXT PAGE
FOR INSIDE STORY

Inside a 58,000 Kva Three Phase Pennsylvania Power Transformer

Two sets of taps per coil assure excellent electrical and mechanical balance in the windings.

All leads are well supported and insulated in heavy pressboard tubes.

Five-legged core reduces height of transformer.

Coils are precompressed with a force equal to the highest short circuit stress and built into transformer at the compressed dimension. This prevents mechanical distortion of the coils if short circuit stresses occur.

Continuous pancake winding in high voltage coils; helical winding in low voltage coils.

Baffle to direct forced oil throughout the coils for more effcient cooling.

Extra heavy insulation at line ends of coil graded down to 46 Kv on neutral ends.

58,000/46,400 Kva forced-oil-cooled with air-cooled heat exchangers. 34,800 Kva self-cooled. Three phase, 60 cycles, 55°C. Temperature rise. High voltage: 161,000 volts Y. Low voltage: 13,200 volts Delta.

For exterior view of this transformer, see other side.

Pennsylvania Transformer Company

A McGraw Electric Company Division

Canonsburg, Pennsylvania • *Greater Pittsburgh District*

circuits, is made up of six basic boxes. Single-phase three-wire, three-phase four-wire, main lugs and main breakers, and general purpose or raintight enclosures are available.
Square D Co, Detroit 11, Mich.

Insulation

Designed to meet Class H requirements and offer economies at higher temperatures. Sil-Thin-Glas 0.002 and 0.003, and Sil-Thin-Bestos 0.003 to 0.0035 possesses exceptional dielectric and tensile strength, it is claimed. Their thinness, flexibility and lightweight permits compact construction.

Available in rolls, sheet or tape form, the insulations are recommended for coil, relay, layer and barriers for transformers, and coil wrapping applications.
Electro-Technical Products, Nutley 10, N. J.

MORE NEW PRODUCTS
about which you should know

Columbia Tape Mills, Inc, East Greenville, Pa., introduced a new annealed **fiber glass tape** that resists fraying . . . Aircraft-Marine Products, Inc, Harrisburg, Pa., have **solderless terminals** for wire sizes from No. 8 to No. 4/0. Tongues of the flag type terminals are designed for a wide range of stud sizes.

Manco Manufacturing Co, Bradley, Ill., announces a suspension, 150-ton thrust, guillotine **cutter.** It is also adaptable for riveting cold rivets up to one in. and for punching and pressing . . . American-La France-Foamite Corp, Elmira, N. Y., has a portable **fire extinguisher** containing 150-lb of dry chemical compound for fighting Class B and C fires.

Carver Pump Co, Muscatine, Iowa, announces two sizes of close-coupled motor-driven **centrifugal pumps** capable of discharging 70 gpm and operating under heads of 110 ft . . . Wall Manufacturing Co, Grove City, Pa., has an instant-heat gun-type **soldering iron** without the use of a transformer, claimed to make soldering more accurate and economical.

From dispatch center in Wichita, orders flow out over RCA radio network to all KGE trucks and cars . . . anywhere in area, day and night.

Field superintendent gets trouble call by radio. Directs field crews to outage while he drives there himself.

Radio-directed crews reach trouble in record time. KGE can cover area with fewer trucks, fewer men . . . thanks to RCA 2-way radio.

How a Kansas Utility

Speeds Up Field Operations

with RCA 2-WAY RADIO

Radio directs 107 trucks and cars all over southeastern Kansas for Kansas Gas and Electric Company. Could your business profit from radio, too? Read answer below . . .

Radio Covers 20,000-Square-Mile Area

Kansas Gas and Electric's system spreads out all the way from Kingman 200 miles east to the state line . . . a big territory crisscrossed with vital power lines . . . a job made to order for RCA 2-way radio coverage.

Gives Faster, Better Service

Eight base radio stations blanket the area with main dispatch headquarters at Wichita. Over this network, calls can reach any truck or auto anywhere in the territory. Result: faster service all along the line, less outage time because radio sends the nearest crew to the trouble. Less lost mileage, less wear and tear. More efficient use of men and equipment. And more reliable communications—especially when telephone lines are knocked down by storms. *It's all typical of what RCA 2-way radio can do in any widely spread-out field operation.*

Could Your Business Use 2-Way Radio?

If you operate far-scattered field crews, RCA 2-way radio can save you time and money in dozens of ways. Puts a "phone" in every truck or car. Operates in all weather. Uses standard tubes. Low operational cost. Easy to install and maintain. Mobile units are compact, lightweight, rugged.

Let RCA Help You . . . Now

RCA helps put radio to work for you. Makes initial study. Helps with FCC permit, installation. And nation-wide RCA Service Company handles installation and service if desired. Find out *now* how 2-way radio can save time and money for *you.* Clip and mail coupon for your FREE 2-way radio booklet . . . *today.*

Dept. 450
RCA Engineering Products
Camden, N. J.

Please send me my FREE copy of illustrated booklet, "RCA 2-Way Radio for Industry"

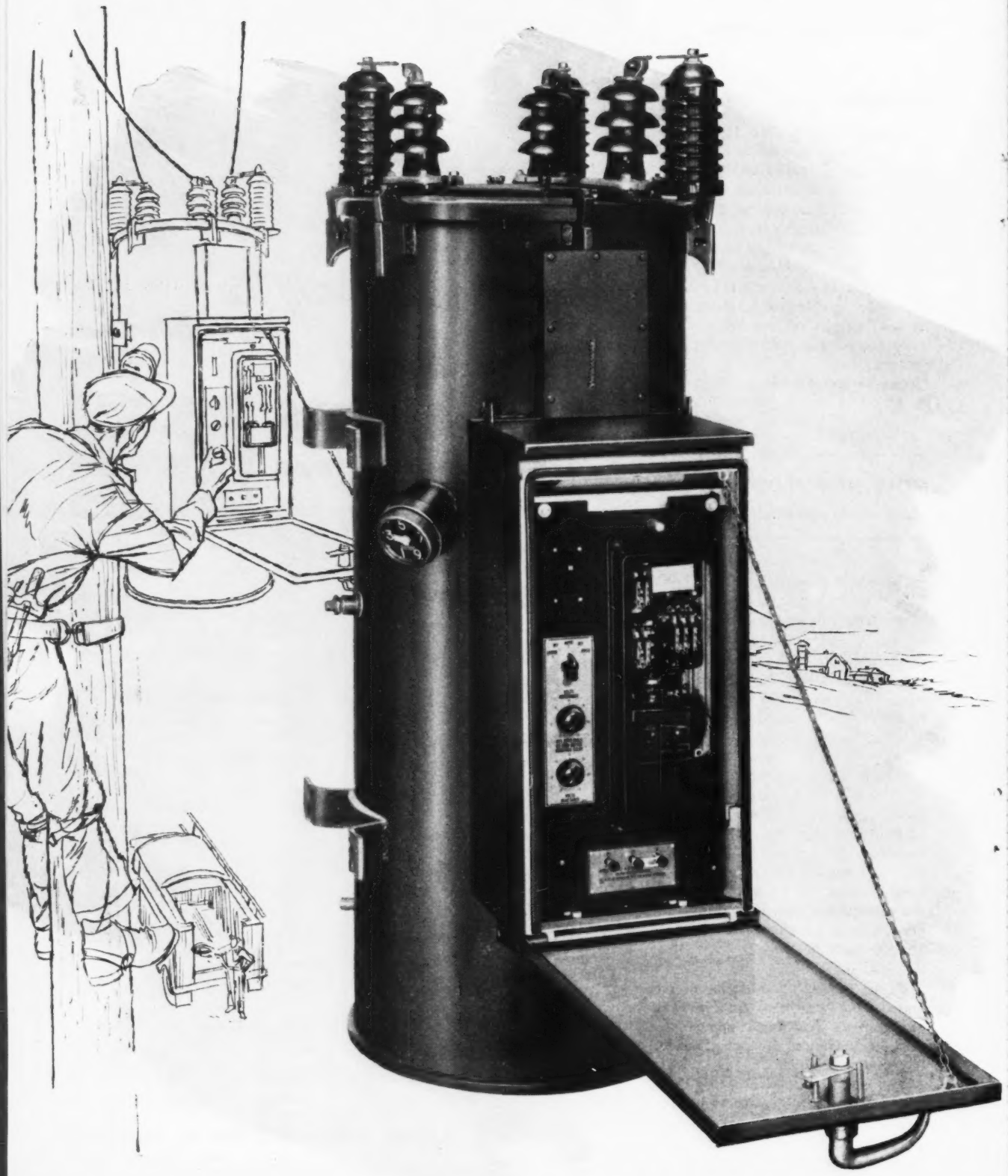
Name_____

Title_____

Company_____

Address_____

RCA **RADIO CORPORATION of AMERICA**



This simple 16-step regulator design lets you correct voltage at "rock bottom" operating cost!

The Westinghouse URL-16 Step Voltage Regulator is basically simple in design. It employs fewer moving parts . . . requires fewer operations to maintain accurate regulation—a fact suggesting unusually low operating cost. Here are a few "specifics" that contribute to this saving:

- ***Only sixteen 1¼% steps*** mean fewer operations . . . less wear occasioned by unit operation.
- ***Direct Geneva drive mechanism*** eliminates intermediate indirect drive devices which may require maintenance.
- ***Fewer contacts*** permit larger size, greater spacing and increased safety factors for longer, trouble-free life.
- ***Packaged control*** in Flexitest* case can be removed as a unit.
- ***Simplified coil design*** has fewer taps in the series transformer windings.
- ***Built-in surge protection*** by "De-ion®" arresters on each line bushing.
- ***Simple dial adjustments*** for all regulator control settings.
- ***Separate tap changer oil*** for maximum life of transformer core and coils.

*T.M.

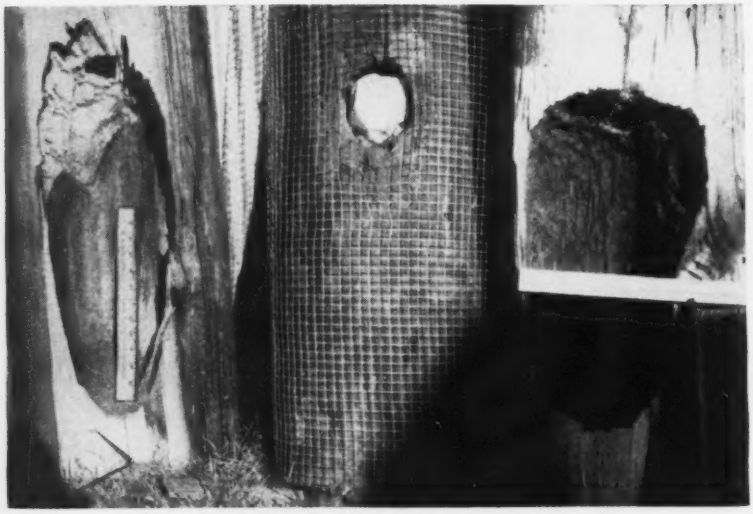
These are the features that reduce maintenance time and costs . . . that make the URL-16 the most economical way to gain close regulation . . . satisfied customers . . . increased revenues. J-10390

Get Complete Information

New Booklet B-5841 contains complete information on the URL-16 Regulator. For your copy, contact your Westinghouse representative or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE . . . IF IT'S

Westinghouse



Louisiana Woodpeckers

To the Editor:

Here is a picture from our Northern Division that shows vividly typical examples of woodpecker damage. The picture shows one of the very few cases where woodpeckers have been able to tear through this mesh. This was the case that I mentioned where we thought we had trapped the woodpecker in the hole. (See EW, Feb. 9, 1953, page 116.) The other poles are shown split open and, while only a three or four-in. hole appeared on the outside, the interior had been hollowed out for a distance of 18 inches to two feet and only a shell remains around the outside of the pole.

W. L. Rush
Transmission and Distribution Engineer

Louisiana Power & Light Co
New Orleans, La.

Surgepurge?

To the Editor:

Most of us readily accept the new names which come with new developments. On the other hand we tend to continue to use groups of words which have become well-thumbed expressions without a thought for the repetitive verbal or written effort.

In the evolution of language, groups of words or well-defined ideas come eventually to be represented by single words. In the engineering field one might ask with justification how long we will continue to use lengthy word groupings because until now these have been generally acceptable. Here are seven words I have coined. Five replace old expressions; two represent new ideas:

equichange — the interchange of equal quantities of energy between two generating systems.

potformer—potential transformer.

curformer—current transformer.

insformer—instrument transformer.

cirrupter—circuit breaker.

surgepurge—lightning arrester.

perem—an abbreviated form of per thousand. One perem represents a one thousandth part.

The term equichange falls directly into place in designating a special case of electrical interchange between power systems. Potformer, curformer, insformer, and cirrupter are concise and readily identified. Taken together these four new words eliminate more than 40% of the syllables used in the double word combinations.

Surgepurge is not elegant, but in contrast it is undoubtedly more descriptive of the purpose of the apparatus than the usual term, lightning arrester. The new word contains 40% fewer letters, 60% fewer syllables.

The perem system is something more than just a new name. It is a simple, new, and useful mathematical concept. Much of the slide rule work of engineers is done to three significant figures. Whether in the future they will use peremages to avoid the usual decimal in percentages, and for example refer to a generator with a 954 perem efficiency, remains to be seen.

H. L. Briggs
General Manager
Winnipeg Hydro Electric System
Winnipeg, Canada

No Newsprint Shortage

To the Editor:

Accuracy, we were told in college journalism classes, is the watchword of good reporting. So, permit me to point out an error in your rather biased article in the Feb. 2 issue, concerning "Detroit Woos Villagers."

In your attempt to make it appear as though the Blade took an unfair advantage of Detroit Edison, you reported that, "the Blade advised that the newsprint shortage would not permit the newspaper to run Edison ads."

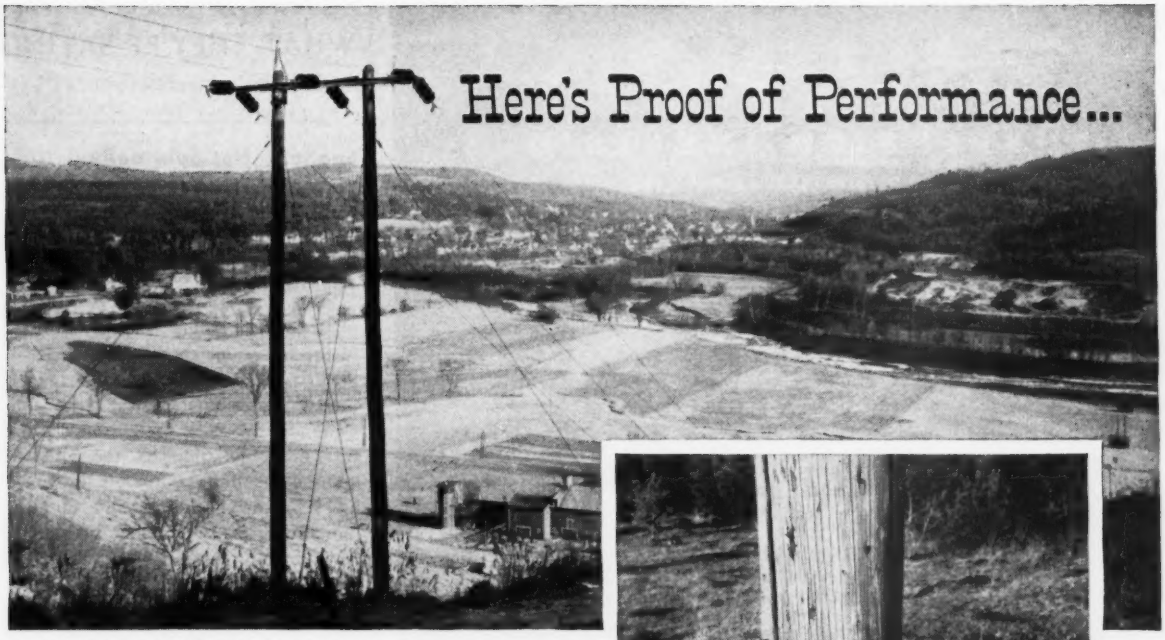
Now you know that there is no newsprint shortage of that scope, and simply by seeing a single copy of the Blade you would have known that the Blade WAS running Edison ads, just as Edison ordered.

The only exception—ONLY EXCEPTION—was when a special edition of the Blade forced speeding up of a deadline—which was announced in the previous week's paper—and the Edison ad came into our shop 48 hours after that deadline. An Edison official, no doubt, gave you the story that "newsprint shortage" caused that omission, for an Edison official also told me that story—until it was corrected when he uttered it. He then acknowledged he "understood" it was newsprint shortage.

I fail to see what benefit you think you give Edison in making it appear as though the press was pitted against the company's attempt to advertise. It was NOT the case and you and the Edison Company should know better.

Walter J. Rummel, Publisher
The Sebewaing Blade
Sebewaing, Mich.

• We published the material in accordance with the information we had in hand. We were informed by hitherto reliable sources that the Blade could not run the ad because of a newsprint shortage and we did not question this statement. Like any other publication we have to depend on the accuracy of our sources. When we're wrong, like any other publication, we're glad to correct matters.



TWO OF THE 370 CREOSOTED POLES in the 14-mile power line of New England Power Company along the Connecticut River.

CLOSEUP of one of these poles at the ground line, the spot where decay is most likely to occur in this area.

Not a single failure *in 25 years*- that's how Creosote Oil has protected this 370-pole line

● The 370 poles in this power transmission line of New England Power Company have an amazing record. In the 25 years since they were put in service between 15-Mile Falls and Littleton, N. H. not a single pole has been replaced due to decay or rot.

The credit for this performance goes to Creosote Oil. Before installation the southern pine poles underwent the "Rueping" or "empty-cell" treatment with eight pound retention.

Frank Buxton, Chief Pole Inspector for the Company, inspects these poles regularly every three years. Inspections consist of visual examinations, thorough soundings and test borings where indicated.

On the basis of the last inspection in 1952, Mr. Buxton says the poles are in excellent condition and give prospects of indefinite continued service. As a conservative estimate, he feels the total life will be 30 to 35 years.

When you use a wood preservative, let service records like this be your guide. They are the main reason why Creosote Oil is the first choice of the wood preserving industry.

And for finest performance, be sure the wood you use is treated with U·S·S Creosote Oil. It is the product of continuous processing in the world's largest tar distillation plant. For complete information, contact our nearest Coal Chemical sales office or write directly to United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S CREOSOTE OIL

3-459

UNITED STATES STEEL

Specify ILLINOIS
SUSPENSION INSULATORS
TOP QUALITY, LONG LIFE,
SUPERIOR PERFORMANCE

A complete line of standard Suspension and Suspension Strain Insulators designed for various types of service and voltages.

Write for NEW Free Insulator Catalog

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

Seal Out Trouble...
For Keeps
with KEARNEY AIRSEAL

MOISTURE, CORROSION AND OXIDATION

are permanently sealed out of every connection that is protected by this easy-to-use, hand-moulded compound. Even on underground applications, the high dielectric strength and chemical stability of KEARNEY AIRSEAL give ageless, tight-sealing protection and insulation.

WRITE FOR SAMPLES AND PRICES

JAMES R. KEARNEY CORPORATION
4224-42 Clayton Avenue • St. Louis 10, Missouri

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO. GUELPH, ONT.

216

For Better Construction SAFER Maintenance

WHAT THEY'RE SAYING

At Industry's Meetings

Spatially Not Spiritually

PHILIP SPORN, president American Gas & Electric Co before graduates of Illinois Institute of Technology at Chicago, Ill.

Any part of the world is within a relatively few hours reach by the rest of the world and therefore any part of it is capable of affecting or being affected by another part. This contradiction in space, spatial integration, was made possible by the airplane and the telephone. But while the world has been integrated spatially, no such integration has taken place politically, economically or spiritually. If it had our troubles would be over.

Importance of Utility PR

B. L. ENGLAND, president, Edison Electric Institute, before the Canadian Electrical Association at Quebec, Canada

First and most obviously, the electric service rendered to its customers is satisfactory, and there are continuing efforts to reach new levels of excellence. Any threats to service, whether arising from natural calamities or from human error, are swiftly and effectively dealt with, to reduce hardship and inconvenience from lack of power to a minimum. In an emergency situation, an accurate, clear and authoritative statement to newspapers and radio stations on what has actually happened will go a long way in quieting public fears, resentment, and fantastic rumors.

Indifference or ill-temper by utility people at a time when customers may find their lives disrupted by unexpected power failures can be extremely damaging. The demonstration of a cheerful willingness to help, even if little can be done at a given moment, may gain a staunch friend, where a heedless or rude response, thoughtlessly given under pressure, may develop a vigorous enemy. The utility's ability to come through in the clutch is much more productive of public approval and appreciation than fair-weather statements on "service" which may not be backed by the record. Having the primary responsibility for getting power to the customer the utility

should also have a strong and legitimate interest in how he uses it.

If the customer feels, for example, that the utility is only interested in him as a source of payment for certain quantities of electricity, it should not be surprising that he should turn a rather unsympathetic ear to explanations of why the utility needs a rate increase.

A public utility has a unique position in the community it serves, and consequently its opportunities and responsibilities for service are greater. It must take up these considerations, not only for the public relations benefits afforded, but for very definite economic reasons.

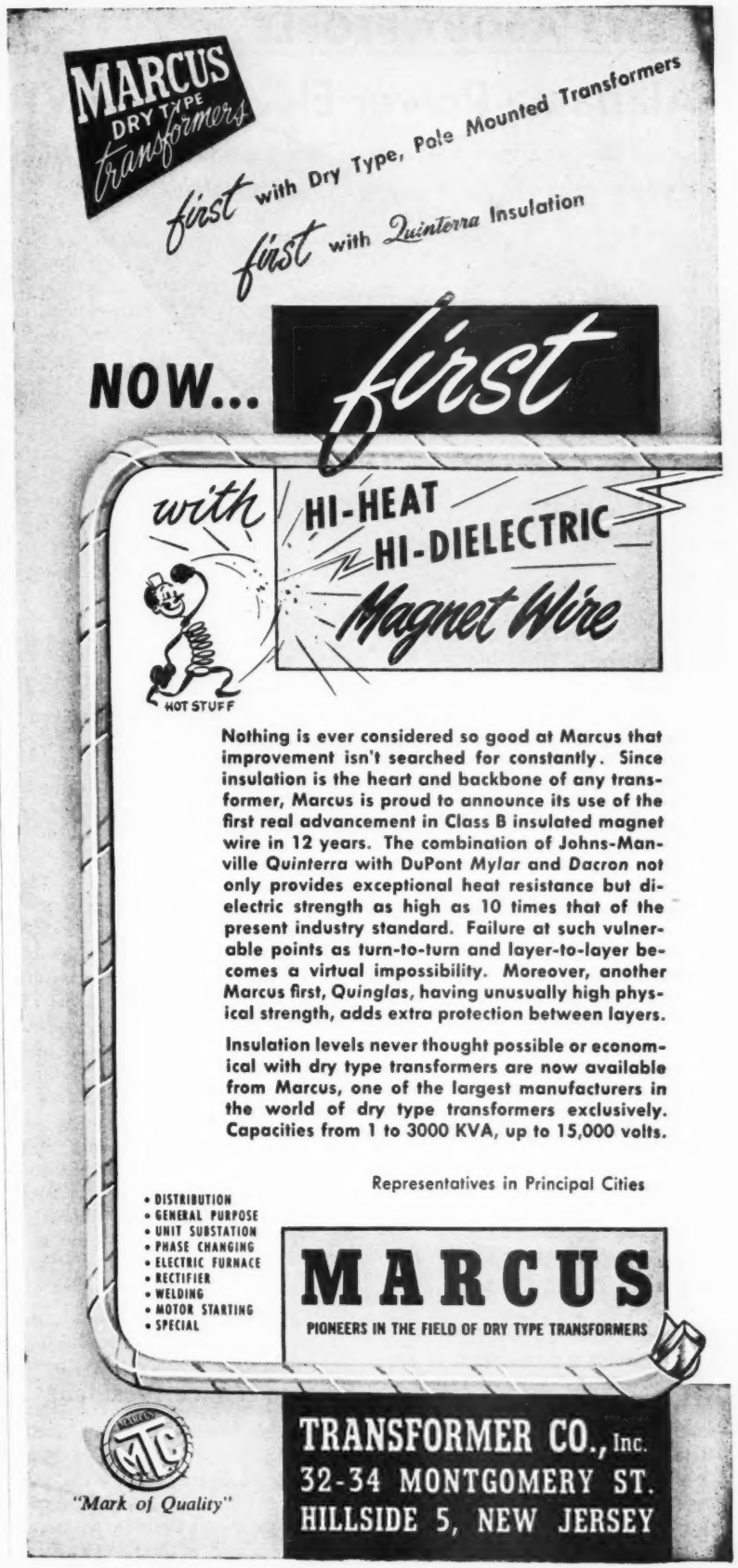
An electric utility cannot move away from its community, if conditions are not to its liking. For its own success, it must serve a growing, successful community. Consequently, the utility has a natural role as a leading citizen in any efforts to improve local conditions, whether they be economic or social.

Technology—Hope or Hobgoblin

HENRY B. duPONT, vice president E. I. duPont de Nemours & Co, before the Divisional Meeting of the Association of Land-Grant Colleges and Universities at Washington, D. C.

Fear of modern technology and misunderstanding of its productive role underlie much of the world's current uneasiness. Technology is everybody's rich uncle. The fruits of technological progress reach the public through the medium of American industry and thorough understanding of all financial, technical and economic requirements are essential. Technology and industry are almost synonymous. To praise technology and condemn industry is like favoring education but condemning the university.

The colleges can clarify much of the misunderstanding of this process by broadening the educational background of both students and faculty. Social scientists in the universities often lack sufficient technical background to follow industrial development, while engineers and physical scientists must learn to evaluate the human aspects of our civilization. Students in the liberal arts colleges should be required to include some technical studies in their curriculum, as engineers are required to have a certain minimum of social and classical credits.


MARCUS
DRY TYPE transformers
first with Dry Type, Pole Mounted Transformers
first with Quinterra Insulation
NOW... first
with HI-HEAT HI-DIELECTRIC Magnet Wire
HOT STUFF
Nothing is ever considered so good at Marcus that improvement isn't searched for constantly. Since insulation is the heart and backbone of any transformer, Marcus is proud to announce its use of the first real advancement in Class B insulated magnet wire in 12 years. The combination of Johns-Manville Quinterra with DuPont Mylar and Dacron not only provides exceptional heat resistance but dielectric strength as high as 10 times that of the present industry standard. Failure at such vulnerable points as turn-to-turn and layer-to-layer becomes a virtual impossibility. Moreover, another Marcus first, Quinglas, having unusually high physical strength, adds extra protection between layers.
Insulation levels never thought possible or economical with dry type transformers are now available from Marcus, one of the largest manufacturers in the world of dry type transformers exclusively. Capacities from 1 to 3000 KVA, up to 15,000 volts.
Representatives in Principal Cities
• DISTRIBUTION
• GENERAL PURPOSE
• UNIT SUBSTATION
• PHASE CHANGING
• ELECTRIC FURNACE
• RECTIFIER
• WELDING
• MOTOR STARTING
• SPECIAL
MARCUS
PIONEERS IN THE FIELD OF DRY TYPE TRANSFORMERS
"Mark of Quality"
TRANSFORMER CO., Inc.
32-34 MONTGOMERY ST.
HILLSIDE 5, NEW JERSEY

NEWS ABOUT PEOPLE

Alabama Power Elects New VP

Cooper Green will assume vice presidency of the utility when he resigns in April as mayor of Birmingham

COOPER GREEN

Cooper Green will resign as mayor of Birmingham in April to become a vice president of Alabama Power Co.

Green comes to the utility field after more than two decades of public service. He served as a member of the Alabama state legislature and as postmaster at Birmingham before he was elected mayor and president, City Commission of Birmingham, in 1940. Green was re-elected to the post of mayor in 1941, 1945, and 1949.

Ex-Head of Mayors' Group . . . The new utility official, a former tackle at Birmingham-Southern College, served as president of the United States Conference of Mayors for the year 1949-50 and as president of the Alabama League of Municipalities for 1950-51, 1952, and 1953. He will resign from the latter post the day he leaves his office as mayor of Birmingham.

He was sent by former President Truman to Helsinki, Finland, in June, 1950, to represent United States cities at the 400th anniversary of Helsinki. In December of that year he was made a knight with the honorary title of "Sir" by the King of Norway.

Texas Electric Reveals Promotions

Texas Electric Service Co, Fort Worth, has made several promotions in its power department.

C. A. Lilly, a director of the company and superintendent of power for 22 years, was named to the new position of consultant of power system operation, system engineering, interconnection, and fuel supply. Chester W. Geue, who has been superintendent of production since 1947, was promoted to head the power department.

Heads Production . . . Formerly superintendent of the utility's Morgan Creek steam-electric generating station near Colorado City, Tex., Walter E. Payne was appointed superintendent of production. Assuming Payne's post at Morgan Creek is Roy P. Bates, formerly superintendent of the Permian Basin steam-electric generating station at Monahans, Tex. Maurice F. Yeary, assistant to Bates at the Permian Basin plant, was made plant superintendent.

The following promotions were made in the transmission section of Texas Electric's power department:

O. S. Hockaday, superintendent of transmission since 1924, was named director of the newly established personnel relations department. Taking Hockaday's place is W. D. Maddrey, formerly assistant superintendent of transmission. Fred H. Schumpp, who joined the company in 1951, was appointed division engineer of the Fort Worth transmission division. Formerly Fort Worth transmission division engineer, E. D. Dorchester was transferred to the company's general office transmission section.

Elected a Vice President

James N. Landis has been elected a vice president of Bechtel Corp, San Francisco engineers and contractors. R. A. Bowman, chief mechanical engineer of the Power Division, has been named manager of engineering for that division. Landis, who has been chief engineer of the Power Division since 1948, was affiliated as an engineering executive with Consolidated Edison Co of New York before going to Bechtel. Prior to joining Bechtel, Bowman served Westinghouse Electric Corp for 20 years in engineering capacities, including an assignment as manager of engineering in the firm's Atomic Power Division.

•

David A. Uebelacker has been elected senior vice president of Ford, Bacon & Davis Canada, Ltd. Uebelacker, who will make his headquarters at Toronto, will continue as a vice president and director of Ford, Bacon & Davis, Inc, New York engineers-constructors. He has been with the American firm since 1932.

Elbert C. Webster has been appointed supervisor of steam production by Dayton Power & Light Co to succeed **Glen Shaw,** who retired recently after 47 years' service with the company.

Philip D. Dilley has been appointed assistant division manager of the South Bend Division of Indiana & Michigan Electric Co. He succeeds Fred R. Shedd, who left the company to join Ohio Valley Electric Corp as vice president (EW, March 2, p 29). Dilley's former post of South Bend district manager will be filled by **Harold M. West,** Benton Harbor (Mich.) district manager. West will be replaced by **Earl J. Yoder,** former commercial and industrial sales supervisor for I&M at Benton Harbor. **John P. Banyon** is Yoder's successor.

Charles F. Branum has been appointed Ahoskie (N. C.) area manager for Virginia Electric & Power Co to succeed R. S. Childrey, who has resigned after serving in the post for several years.

Dr Charles M. Slack has been appointed director of research and engineering of Westinghouse Electric Corp's Lamp Division, Bloomfield, N. J. Dr Slack, who joined Westinghouse in 1927, succeeds **Dr A. M. Hageman,** who has retired after 35 years' service. Prior to this appointment, Dr Slack served for the past three years as assistant manager of the firm's Atomic Power Division. His

Steel-Service Team

In there - - Pushing

Now more than ever the help of an experienced steel-service organization is especially valuable. That's why it may well pay to get in touch with the nearest Ryerson office or plant.

Not that we can *always* furnish the steel you need—much as we would like to, and hard as we try. But, with controls relaxing a little and a few steel products coming into better supply, there are more opportunities for experience and ingenuity to take over. And experience, ingenuity—and the will to help are never in short supply at Ryerson.

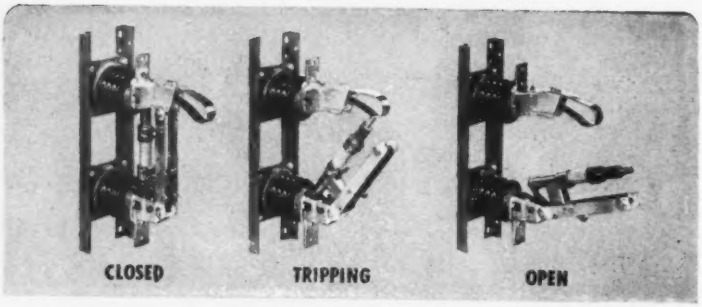
Your nearby Ryerson plant is staffed with specialists on carbon, alloy and stainless steels who are always ready to work with you. Often they can suggest practical alternates when the steel you need is not available. And back of the Ryerson plant nearest you stand the resources of fourteen other Ryerson plants, making up the nation's largest steel-service organization. So when a kind or size is not on hand locally, we may be able to ship it from another plant.

With all Ryerson plants cooperating, and with Ryerson specialists helping to make the most of available steel, we are usually able to maintain service in spite of the current situation. So we suggest that you check with us regularly for all your steel requirements . . . There is nothing too difficult when it comes to working with a Ryerson customer.

Principal Products: Carbon, Alloy & Stainless Steels — Bars, Structurals, Plates, Sheets, Tubing, Machinery & Tools, Etc.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND • DETROIT
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE



for interrupting high voltage circuits in air without external arcing or contact burning..

3E AIR INTERRUPTER SWITCHES

Loads up to 600 amperes at 15,000 volts can be opened with these 3E switches. Magnetizing currents of transformers and charging currents of lines and cables are also efficiently interrupted.

Switches are available for hook stick or group operation in either open or enclosed styles... and can be supplied in combination with power fuses for economical overload and short circuit protection.

For full details write for Booklet

THREE

ELECTRICAL ENGINEERS EQUIPMENT CO. Melrose Park, Illinois

The 7-Range Clip-On Volt-Ammeter

FERRANTI

Offers These Important Advantages

- Measures up to 1000 amps up to 600 volts.
- Convenient ONE HAND operation trigger action.
- Thumb operated range selector switch.
- 7 ranges 5 current and 2 voltage.
- Insulated core shockproof construction.
- Takes cables up to 2¼" diameter.
- Distinct calibrations easy to read.
- Suitable for 50-70 cycles.

RANGES: 0-10 amps; 0-25 amps; 0-100 amps; 0-250 amps; 0-1000 amps; 0-150 volts; 0-600 volts.

FERRANTI ELECTRIC, INC.

30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.

FERRANTI, LTD., Hollinwood, England — FERRANTI ELECTRIC, LTD., Toronto, Canada

successor in the managerial post is **Edmund T. Morris,** formerly manager of sub-contracting in the Westinghouse Defense Products organization.

Robert I. Kabat, for the past two years manager of Oneida-Madison Electric Cooperative, Bouckville, N. Y., has joined the general service department of the National Rural Electric Cooperative Association.

Dr R. C. Ulmer, for the past seven years technical director of E. F. Drew & Co, has joined the engineering department of Combustion Engineering-Superheater, Inc, New York, where he will be engaged in development work. At one time Dr Ulmer was affiliated with Detroit Edison Co, where he was associated with power plant operating problems.

Francois Roy, a member of the transmission line staff of Shawinigan Water & Power Co since 1915, has been appointed as assistant vice president of the company. Roy, who was appointed district superintendent at Shawinigan Falls in 1944, will continue to make his headquarters there.

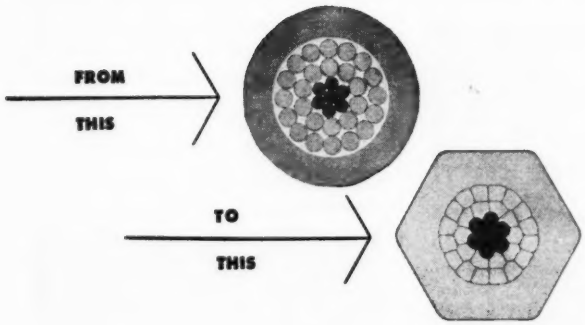
Dr Cyril G. Veinott has joined Reliance Electric & Engineering Co, Cleveland, as consulting engineer on ac machinery. Dr Veinott, a past vice president of the American Institute of Electrical Engineers, comes to Reliance from Westinghouse Electric Corp, where for the past 25 years he had been engaged chiefly in small motor engineering.

Robert M. Burns, chemcial co-ordinator and director of chemical and metallurgical research for Bell Telephone Laboratories, Murray Hill, N. J., has been designated to receive the 1953 Willis Rodney Whitney Award of the National Association of Corrosion Engineers for achievement in corrosion science. He joined the Laboratories upon its organization in 1925.

Peter Barry, assistant superintendent of the steam distribution department for Rochester (N. Y.) Gas & Electric Corp, has been promoted to safety director of the utility.

J. A. Christie, who has been chief accountant for the British Columbia Power Commission since 1947, has been named acting financial manager, a newly created position which is an

T & B METHOD



. . . IN SECONDS

Compression Dead End

THE STRONGEST CONNECTION FOR ACSR

T & B connector assemblies for dead-ending ACSR develop tensile strengths greater than that of the cable itself. Coated serrations inside the inner clevis barrel provide a sure, certain grip that matches the full strength of the steel core. The aluminum outer compression sleeve assures high conductivity of the joint. Both sleeves are easily installed with light-weight, portable T & B METHOD hydraulic tools which compress joints hexagonally and force the fitting and cable into one homogeneous mass . . . all in a few seconds.

Electrically, T & B Dead Ends offer higher conductance than equal lengths of cable — the one-piece aluminum tube provides uninterrupted current path from cable to jumper loop. During compression, the special serrated T & B compression sleeve penetrates the aluminum oxide film on the *outside* cable strands providing clean overall metal-to-metal contact, as well as minimum current loss. Oxide film on the *inner* strands is also effectively abraded, thereby maintaining a dense, tight joint.

Though the use of an oxide-inhibiting agent is recommended for T & B METHOD aluminum connections, no joint compounds are needed to obtain maximum electrical efficiency.

Investigate the complete line of T & B fittings for ACSR, aluminum cable and copper cable installation — they offer you important savings in time and installation costs. Write for your free copy of T & B Bulletin U-2.

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IT'S THE MARK OF AN AUTHORIZED T & B DISTRIBUTOR

The complete line of T & B fittings for conductors and raceways is sold only by recognized electrical wholesalers. It's our way of assuring you the service and savings of a friendly local source. Call him for all your electrical needs.

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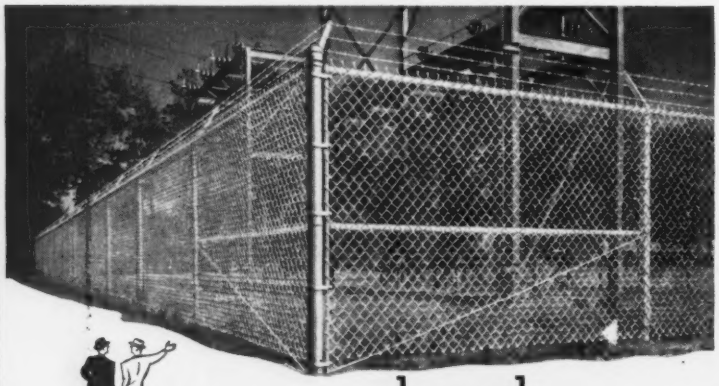

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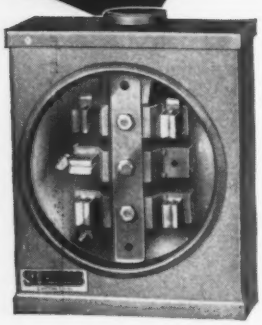

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SUPERIOR SWITCHBOARD & DEVICES CO.

CANTON, OHIO

A subsidiary of The Union Metal Manufacturing Company

amalgamation of the posts of treasurer and chief accountant. Christie succeeds **J. D. W. Blyth,** who has resigned. In other appointments, **E. C. D. Wilson** was made secretary; **Mrs Phyllis K. Brown,** assistant secretary; and **C. B. Danby,** acting deputy financial manager.

OBITUARY

Lane D. Webber

Lane D. Webber, 68, vice president of Southern California Edison Co and the National Association of Manufacturers, died Feb. 14 at San Diego, Calif.

Webber started with the Edison company in 1935 as a tax counsel. He was elected a vice president in 1942 and was made head of the utility's public relations department in 1949.

Prior to his association with Edison, he served for 13 years as vice president and trust officer of the First National Trust & Savings Bank, San Diego. He was a past president of the California Bankers Association.

Guy W. Faller

Guy W. Faller, 74, retired president and board chairman of the Public Service Co of Colorado, died Feb. 12 at Mesa, Ariz.

Faller had been connected with Public Service and its predecessors for almost 50 years, coming to Denver, Colo., in 1904 as an assistant foreman with Denver Gas & Electric Light Co, parent of the present firm. Later he served with utility firms in Amarillo, Tex., and H. L. Doherty & Co, Denver.

Faller was named vice president and general manager of Public Service in 1934, becoming president and general manager in 1940. Three years later he became chairman of the board, serving in this capacity until his retirement in 1951.

He was elected president of the Rocky Mountain Electrical League in 1936.

Ausben R. Deck, 49, system engineer for Metropolitan Edison Co, died recently at Reading, Pa. With the utility since 1924, he was chief system operator for Metropolitan Edison prior to his promotion to system engineer in 1948.

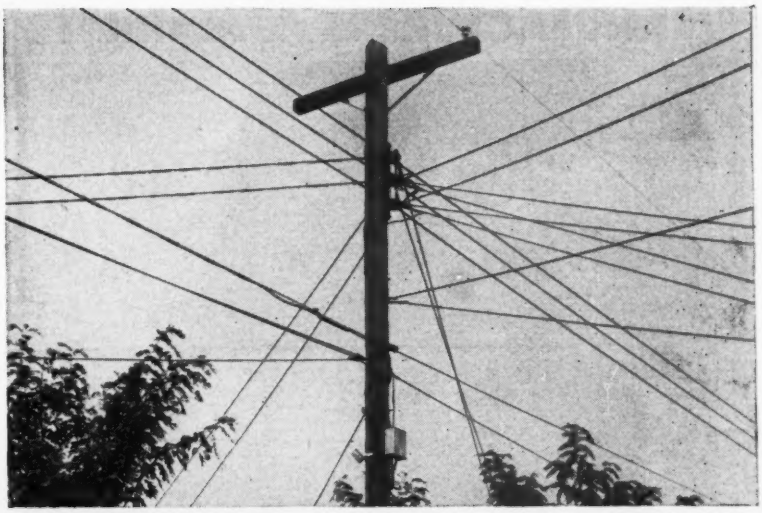
Samuel C. Wilkerson, 63, superintendent of power for Aluminum Co of America's Power Division at Calderwood, Tenn., died Feb. 14 at Maryville, Tenn. Since 1919 he was employed with Alcoa and subsidiary companies. Before joining the firm, he worked on various power developments in Mexico, Arkansas, and Pennsylvania.

Arnold Pfau, 79, retired consulting engineer of the hydraulic department of Allis-Chalmers Manufacturing Co, died Feb. 8 at Roanoke, Ill. With A-C more than 40 years, Pfau was one of the organizers in 1904 of the company's hydraulic turbine department. Born and educated in Switzerland, he was originally connected with the water wheel builders, Escher-Wyss & Co. In the United States he was identified with major impulse wheel installations.

J. Ross Roberson, 70, who was superintendent of the Southern Division of Puget Sound Power & Light Co when he retired in 1949, died at Olympia, Wash., Feb. 19. At the time of his death he was Olympia commissioner of public works.

James H. Stribling, 74, a retired district manager for Virginia Electric & Power Co, died Feb. 17 at Richmond, Va. Stribling, who joined the company in 1903, was manager of the Richmond district when he retired in 1947. He was named to the post in 1944.

Gustave J. Jaspers, 68, president of the board of commissioners of Wahkiakum County PUD at Cathlamet, Wash., since 1946, died at Puget Island, Wash., Feb. 16.



"Our Koppers Poles are still sound after 24 years' service,"

says S. R. Blakeman, Supt., City Water & Light Dept., Dyersburg, Tenn.

Koppers Pressure-Creosoted Pole being admired by S. R. Blakeman, Supt., City Water & Light Department, Dyersburg, Tennessee.

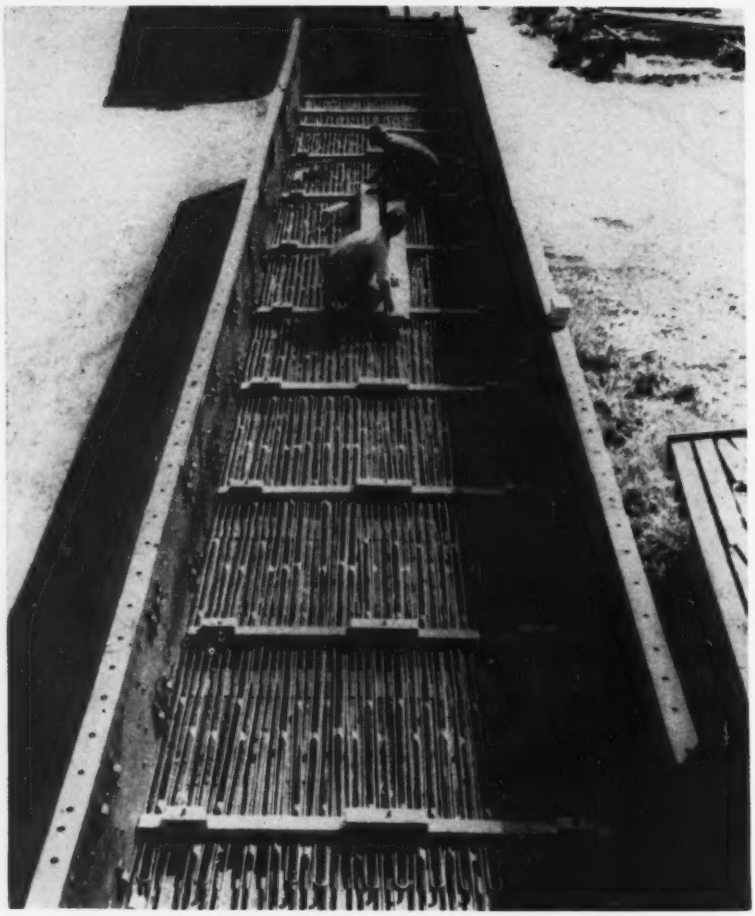
• "In 1928," Mr. Blakeman reports, "we used Koppers Poles on a particular job in our system. They were the only pressure-creosoted poles used on this job; some untreated poles were used, too.

"Now, 24 years later, all the untreated poles are gone, but the Koppers Poles in line today are still sound. Some have been retired where longer poles were needed, but they were put to use again in other parts of our system. I do not recall where any of the treated poles had to be replaced because of rot or decay."

This shows the kind of service utility companies are getting from Koppers Full-Length Pressure-Creosoted Poles. Specify these durable poles and you'll get this money-saving service, too.

KOPPERS COMPANY, INC.
Pittsburgh 19, Pa.

KOPPERS **PRESSURE-CREOSOTED WOOD**



Heaters Slated for Albeni Falls Dam

Longest Calrod tubular heaters ever built by General Electric Co are shown being loaded on a special 65-ft gondola car for shipment. Formed in a "U" shape, each heater is 120 ft long.

The heaters will be installed in the Albeni Falls Dam near Newport, Wash., now being constructed under supervision of the Army Corps of Engineers' district engineer at Seattle. The GE units will enable the dam gates to be lowered and raised during sub-freezing weather conditions.

Canadian Firm Working on 140,000-Hp Turbine

Vancouver (B. C.) Engineering Works, Ltd, has reported that progress is being made rapidly at its Vancouver plant on what is claimed to be the world's largest multi-nozzle impulse turbine. The turbine is being built for installation at the Kemano powerhouse of the Aluminum Co of Canada, Ltd.

The turbine is a four-nozzle impulse type rated at 140,000 hp at 327 rpm. It is predicted that this guaranteed output could be increased to 150,000 hp. It is reported this rating also makes the unit the world's largest from a standpoint of horsepower output, exceeding the units at Grand Coulee.

When completed, the Kemano power plant will have installed 16 such impulse turbines. Space requirements for the complete development in the underground power plant necessitate a chamber over 1,000 ft long, 80 ft wide, and 135 ft high.

The Pelton waterwheels will each drive a direct-connected, vertical, three-phase, 60-cycle, 13,800-v power generator. Each group of two generators will feed into a bank of three single-phase transformers rated at 300 kv.

Westinghouse's Income, Sales Are Up for 1952

Westinghouse Electric Corp's 1952 net income rose 6% over 1951 as net sales increased 17% to set a record.

Net income for 1952 was $68,581,603, equal to $4.23 per common share, compared with $64,578,202, $4.03 per common share, in 1951.

Sales for 1952 totaled $1,454,272,598 compared with $1,240,801,296 in 1951.

Even though Westinghouse sales have risen in the last three years from $1 billion to nearly $1.5 billion, Pres Gwilym A. Price said the initial costs of getting new plants into production may be expected to defer full realization of net earnings from the expansion program. In 1952 Westinghouse had spent $101 million of its $296-million expansion program.

For the fourth quarter of 1952, net income was $19,841,000, $1.23 per common share, compared with net income of $21,821,000, $1.37 per common in the last quarter of 1951.

Boosts Copper to 32¢ a lb

Anaconda Copper Mining Co last week boosted the price of its domestic copper production to 32¢ a lb. This price is 7½¢ a lb higher than the former ceiling of 24½¢ established by the Office of Price Stabilization.

MANUFACTURERS' EARNINGS

Company	Period Months	Ended	Net Income 1952	Net Income 1951	Earnings Per Common Share 1952	Earnings Per Common Share 1951
Clark Equipment Co	12	Dec.	$5,504,246	$5,276,726	$5.46	$5.23(a)
A. O. Smith Corp	3	Jan.	600,857	1,308,508	.60	1.31
	6	Jan.	1,209,904	2,719,134	1.21	2.72
Westinghouse Electric Corp (b)	12	Dec.	68,581,603	64,578,202	4.23	4.03
Worthington Corp	12	Dec.	6,102,617(c)	6,083,938	5.44(d)	5.73(d)

Notes—(a) Based on shares now outstanding; (b) These figures have been audited; (c) After a $417,000 carry-back tax credit; (d) On shares outstanding at end of period.

It compares with 27½¢ a lb set by Kennecott Copper Corp and 28½¢ by Phelps Dodge Corp after copper price controls were lifted recently.

MANUFACTURING BRIEFS

Industrial Tape Corp, New Brunswick, N. J., has opened new warehouse facilities at 107 Pittsburgh St., Dallas, Tex. The operation will handle distribution of the firm's line of "Permacel" and "Texcel" tapes in the Southwest.

Midwest Piping Co, Inc, is the new name for Midwest Piping & Supply Co, Inc, St. Louis. No change in ownership, management, personnel, or activities is contemplated. Name change was brought about because Midwest has grown away from the supply business, although supply operations are conducted in the St. Louis area.

Westinghouse Electric Corp has filed with Securities and Exchange Commission two statements seeking registration of (1) 200,000 shares of common stock, $12.50 par, to be offered under "Employee Stock Plan" and (2) 498,735 shares of common stock, $12.50 par, to be offered under "Restricted Stock Option Plan" to certain officers and executive employees.

SALES ASSIGNMENTS

COMPANY STAFFS

United States Rubber Co has announced five new assignments in its electrical wire and cable department. John Blake has been appointed manager of state and municipal sales and E. T. Corbus has been named manager of electrical utilities sales. Both are located at the company's headquarters at 1230 Avenue of the Americas, New York. J. W. Loveland, located at the New York branch at 191 Hudson St., is now Eastern division sales manager succeeding Corbus. C. R. Pickens will be Southeastern division sales manager at Atlanta and H. J. Cluver will be the Middle-Atlantic division sales manager with headquarters at Philadelphia.

Reliance Electric & Engineering Co, Cleveland, has apoointed Andrew C. Perrin to the newly created post of West Coast district sales manager. Perrin, a sales application engineer operating out of the company's Chicago office for the past six years, will make his headquarters in San Francisco.

REPRESENTATIVES

Bersted Manufacturing Co, a division of McGraw Electric Co, has named Burkett Sales Co, Milwaukee, as its sales representative, to cover Wisconsin and upper Michigan.

CURRENT NEWS
FLORIDA IS NATION'S FASTEST GROWING STATE
POPULATION INCREASED 89% 1930 TO 1950
LEADS COUNTRY IN NEW RESIDENTIAL CONSTRUCTION
Helping Florida Grow, F.P.&L. Has Nearly Tripled its System Capability Since the War

and CONTROL CORPORATION helps Florida grow!

● Planning and building for the sound expanding economy of Florida has been a constant challenge to the Florida Power & Light Company. Control Corporation's Super-Trol* is helping F.P.&L. do that big job.

F.P.&L. credits Super-Trol with helping to use manpower more efficiently. Under emergency conditions time is saved. Over all, Super-Trol helps Florida Power & Light Company customers enjoy better service.

Most recent of F.P.&L. Super-Trol Inter-city Systems is the Cocoa Substation, controlled from Fort Pierce sixty-five miles away. F.P.&L. already uses Super-Trol in the Miami Area and the equipment is being added to six substations.

Control Corporation equipment is used by 80 of America's leading power companies. Investigate Control now. Send for Utility Bulletin AA-2.

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ADLAM TOOL & SUPPLY CO., LTD., MONTREAL
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MEETINGS CALENDAR

North Central Electric Association
Electrical Industries Meet, Hotel Nicollet, Minneapolis, March 8-11; Accounting Conference, Dyckman Hotel, Minneapolis, March 23-24; Accident Prevention Committee, Dyckman Hotel, Minneapolis, April 21; Distribution-Equipment Engineering Meeting, Dyckman Hotel, Minneapolis, April 22; South Dakota All-Electrical Industry Meeting, Ward Hotel, Aberdeen, S. D., April 24-25.

North Central Electrical Industries
1953 Electrical Industry Convention, Hotel Nicollet, Minneapolis, March 8-11.

National Association of Purchasing Agents
Public Utility Buyers Group, Mid-Winter Conference, Hotel Roosevelt, New Orleans, March 9-10; Annual Meeting, Statler Hotel, Los Angeles, May 24-27.

National Electrical Manufacturers Association
Winter Conference, Edgewater Beach Hotel, Chicago, March 9-12; Annual Meeting, Haddon Hall, Atlantic City, N. J., Nov. 9-12.

Public Utilities Advertising Association
Region 5, Jefferson Hotel, Richmond, Va., March 12-13; National Convention, Chase Hotel, St. Louis, May 7-8.

National Association of Corrosion Engineers
1953 Conference-Exhibition, Sherman Hotel, Chicago, March 16-20.

Illuminating Engineering Society
Canadian Regional Conference, Chateau Laurier, Ottawa, Ont., March 23-25; Southwestern Regional Meeting, Hotel Baker, Dallas, Tex., April 12-14; Pacific Northwest Regional Conference, Multnomah Hotel, Portland, Ore., April 23-24; East Central Regional Conference, Hotel Lord Baltimore, Baltimore, Md., May 14-15; Southern Regional Conference, Sedgefield Inn, Greensboro, N. C., May 18-19; Great Lakes Regional Conference, Syracuse Hotel, Syracuse, N. Y., May 25-26; National Technical Conference, Hotel Commodore, New York, Sept. 14-18.

A&M College of Texas
Conference for Protective Relay Engineers, Dept. of Electrical Engineering, College Station, Tex., March 23-25.

Southeastern Electric Exchange
20th Annual Conference, Boca Raton Hotel, Boca Raton, Fla., March 23-25, Engineering-Operation Section, Edgewater Gulf Hotel, Edgewater Park, Miss., April 16-17; Industrial Power Sales Conference, Fort Sumter Hotel, Charleston, S. C., May 21-22.

Institute of Radio Engineers
National Convention-Exhibit, Waldorf-Astoria Hotel and Grand Central Palace, New York, March 23-26.

American Power Conference
Annual Meeting, Sherman Hotel, Chicago, March 25-27.

Oklahoma Utilities Association Convention
Tulsa Hotel, Tulsa, March 26-27.

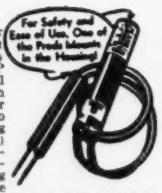
Edison Electric Institute
19th Annual Sales Conference, Edgewater Beach Hotel, Chicago, March 30-April 2; Accident Prevention Committee, Edgewater Beach Hotel, Chicago, May 4-5; Transmission-Distribution Committee, Edgewater Beach Hotel, Chicago, May 5-6; Electrical Equipment Committee, Sir Walter Hotel, Raleigh, N. C., May 11-12; Meter-Service Committee, Wentworth-by-the-Sea, Portsmouth, N. H., May 25-27; 21st Annual Convention, Atlantic City, N. J., June 1-4.

***Southeastern Metermen's Association**
28th Annual Short Course Conference, University of Florida, Gainesville, Fla., April 3-10.

Northwest Public Power Association
Engineering-Operation Section, Osburn Hotel, Eugene, Ore., April 16-17; Annual Convention, Ridpath Hotel, Spokane, Wash., May 6-8; Accounting Section, Monticello Hotel, Longview, Wash., Sept. 17-18.

The Original Prod-Mount Voltage Tester is the KNOPP

Patented



Say "Goodbye to risky time-wasting fuss in testing" with the 5 main safety features in the KNOPP Voltage Tester: (1) original Prod-mounting Socket in housing making this tester easier, faster, and safer to use and ending time-wasting "three-handed" testing; (2) protection through Dual indication of voltage by solenoid and neon lamp working independently; (3) positive scale readings; (4) signal by hum and vibration; and (5) thorough insulation throughout, even to the sharp point of each prod.

Well-built and shockproof in a LAMINATED bakelite housing, the KNOPP Voltage Tester tells immediately and simply if circuit is open or closed; magnitude of voltage between 110 and 600; a-c or d-c, pure or rectified; 25 or 60 cycles—for testing old and new circuits, fuses, locating grounds, etc.

Get the widely-used and reliable KNOPP Voltage Tester with the time-proved Prod-Mount, and other safety features from your dealer, or write for illustrated free, new descriptive Bulletin No. 425.

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4236 Holden Street Oakland 8, Calif.

PREVENT SERVICE FAILURES IN WINTER STORMS

SPECIFY E-M SERVICE MASTS

On buildings where services must be attached above the roof (2322, 1947 Code), don't take chances with flimsy supports which might go down some windy winter night.

Ample Strength — Extra Safety

2½" rigid conduit, without guys, provides extra margin of safety needed for long spans. Developed in cooperation with Utility Engineers, EM Service Masts assure a lifetime of freedom from service drop troubles. Shipped complete, ready to install. Get the complete story in our BULLETIN 55. WRITE TODAY!

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POLE LINE HARDWARE
154 Angell Street • Battle Creek, Mich.

Pacific Coast Electrical Association
Administrative Services Section Conference, Phoenix, Ariz., April 8-9; Annual Convention, Hoberg's, Lake County, Calif., May 13-15.

Missouri Valley Electric Association
Engineering Conference, President Hotel, Kansas City, Mo., April 8-10.

Northwest Electric Light & Power Association
Engineering-Operation Section, Multnomah Hotel, Portland, Ore., April 8-10; Business Development Section, Davenport Hotel, Spokane, Wash., May 4-6.

Maryland Utilities Association
Annual Business Conference, Lord Baltimore Hotel, Baltimore, April 17; Fall Conference, Cavalier Hotel, Virginia Beach, Va., Sept. 18-19.

Electric-Gas Utility Accountants
National Conference, Sherman Hotel, Chicago, April 20-22.

***American Institute of Electrical Engineers**
Southern District Meeting, Hotel Seelbach, Louisville, Ky., April 22-24; Northeastern District Meeting, Sheraton Plaza Hotel, Boston, April 29-May 1; Summer General Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 15-19; Pacific General Meeting, Hotel Vancouver, Vancouver, B. C., Sept. 1-4; Middle Eastern District Meeting, Daniel Boone Hotel, Charleston, W. Va., Sept. 29-Oct. 1; Fall General Meeting, Muehlebach Hotel, Kansas City, Mo., Nov. 2-6.

***Pennsylvania Electric Association**
Spring Meeting, Meter Committee, Hotel Alexander, Hagerstown, Md., April 23-24; Spring Meeting, Communications Committee, Hotel Roosevelt, Pittsburgh, April 30-May 1.

Rocky Mountain Electrical League
Annual Spring Conference, Shirley Savoy Hotel, Denver, Colo., April 26-28.

American Society of Mechanical Engineers
Spring Meeting, Deshler-Wallick Hotel, Columbus, Ohio, April 28-30; Semi-Annual Meeting, Statler Hotel, Los Angeles, June 28-July 2; Fall Meeting, Sheraton Hotel, Rochester, N. Y., Oct. 5-7; Annual Meeting, Statler Hotel, New York, Nov. 29-Dec. 4.

Chicago Electrical Industry Show
Sponsored by Electric Association and Electrical Maintenance Engineers of Chicago, Conrad Hilton Hotel, Chicago, May 11-14.

Third International Congress on Electro-Thermics
Paris, France, May 18-23.

Electrical Manufacturers' Representatives Association of Michigan, Inc.
1953 Electrical Exhibition, State Fair Grounds, Exhibition Bldg., Detroit, May 19-22.

National Association of Electrical Distributors
45th Annual Convention, Conrad Hilton Hotel, Chicago, May 24-29; Spring Meeting, Pacific Zone, Huntington Hotel, Pasadena, Calif., June 8-10.

California Municipal Utilities Association
Annual Conference, Clift Hotel, San Francisco, June 9-12.

American Welding Society
Exposition held in conjunction with National Spring Technical Meeting, Shamrock Hotel, Houston, Tex., June 16-19.

Canadian Electrical Association
Annual Convention, Manoir Richelieu, Murray Bay, Que., June 25-27.

American Society for Testing Materials
Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 29-July 3.

International Association of Electrical Leagues
18th Conference, Fairmount Hotel, San Francisco, Aug. 5-8.

Instrument Society of America
8th National Instrument Exhibit, Sherman Hotel, Chicago, Sept. 21-25.

*Addition this week.

On this modern New York City parkway it's

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MANY OF THE LARGEST American municipalities and public utilities have standardized on Amplex Street Lighting Lamps both for superior lighting and for the extraordinary savings that they bring to every installation. These lamps are specially designed and built to survive the vibration and shock of road traffic and to maintain a maximum percentage of light output throughout their long-burning life.

Amplex offers you the most complete line of street lighting lamps ever put on the market . . . a type and wattage for every kind of service. Among these, Amplex Weatherproof Bulbs are probably today's fastest-growing specification. Amplex Weatherproof Lamps are formed of "hard glass," ending failures due to climatic conditions . . . providing maximum dependability and savings.

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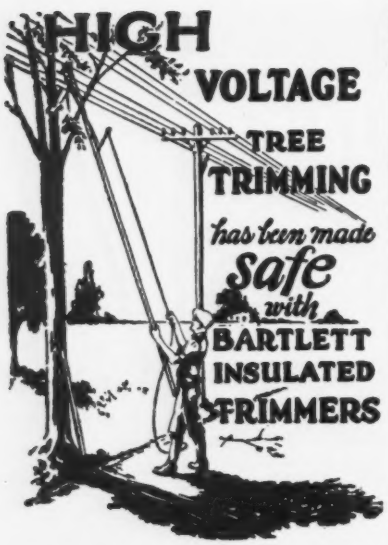

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EFFICIENCY—compound lever cutting head easily snips branches up to 1¼ inches.

STRENGTH—Laminated Douglas Fir poles and finest tool steel blades insure ample strength and long service.

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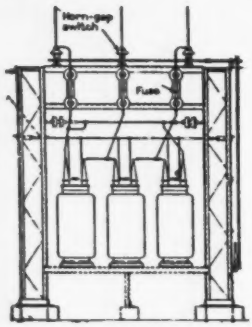

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OUTDOOR & INDOOR SWITCHES

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TECHNICAL LITERATURE

New Products Index—A new all-products folder is now available from Lewis-Shepard, Watertown, Massachusetts, manufacturers of the Master Line of industrial trucks. Incorporating the many new Spacemaster models, this two-color circular includes descriptions and photographs of basic units in the Master line: electric fork trucks—models "E", "J" and "M", 5 models of the Jackstacker and a section on the new Jacklift electric models. In the hand line: stackers, hoisters and working height lifters; skid platforms and storage racks; hydraulic and mechanical trucks; and basic models of several floor trucks are also included and fully illustrated. A copy may be obtained by contacting the local representative or by writing directly to the company at the above address.

Vertical and Horizontal Shaft Units—A completely new 48-pg Herman Nelson Unit Heater brochure describing both vertical and horizontal shaft units, is now available from the Heating and Ventilating Department, American Air Filter Company, Inc, Louisville, Kentucky. The booklet, No 3570, incorporates many new features not included in previous literature. Besides giving an accurate description of component parts and dimensions for both style heaters, expanded steam and hot water capacities are included. Steam capacities are now tabled up to 50 P. S. I. at 50°, 60°, or 70° entering air. The hot water tables include capacities at 180° and 200°. This new booklet may be obtained free of charge by writing to Heating and Ventilating Department, American Air Filer Company, Inc, 215 Central Avenue, Louisville, Kentucky.

Microwave Communication—A new book on microwave communication has just been made available. It describes in detail the part played by IT&T research and development in effecting the rapid growth of microwave transmission, the salient technical and economic advantages of the system, and typical installation. For further information contact the International Telephone & Telegraph Corp, 67 Broad St, New York 4, N. Y.

Automatic Recording and Control of pH-Hydrogen Ion Concentration—Brown-Cambridge system for automatic recording and control of pH is described in new four-page data sheet. Sheet includes discussion of measuring system components adjustments for operation, as well as variations in recording and control systems for electric or pneumatic modes of control and single or multi-point recording—Instrumentation Data Sheet No 10.7-1 Refer inquiries to Station 2.3 Minneapolis Honeywell Regulator Co, Brown Instruments Division, Wayne & Wendrim Aves, Philadelphia, Pa.

Engineered Motor-Generator-Sets: This is the subject of a new, 4-pg, illustrated bulletin (F-2502) just issued by the Reliance Electric & Engineering Co, Cleveland, Ohio. Briefly described is the complete line of "custom-tailored" M-G Sets—shunt or compound wound, from ¾ to 1,000-kw—built by Reliance to provide power for constant-voltage or adjustable-voltage systems and engineered to include synchronous or induction motors. Copies of this interesting, informative bulletin are available on request. Write to the Reliance Electric & Engineering Co, 1088 Ivanhoe Road, Cleveland, Ohio.

Lumber Mills Electrical Equipment—Electrification of all processing operations in

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● The extra durability and dependable performance you get from Wickwire Rope is a natural result of over 125 years of specialization in the manufacture of wire and wire products. From molten metal to finished rope, every phase in the manufacture of Wickwire Rope is handled in our own plants, under constant and careful control.

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The Colorado Fuel & Iron Corporation, Denver, Colorado
The California Wire Cloth Corporation, Oakland, California
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the lumber industry is described in a new 50-pg book available from the Westinghouse Electric Corporation. Standard and special equipment is described and application data is provided. Freely illustrated with on-the-job photographs, this book takes the reader on a tour of a typical lumber mill—stopping to describe some 21 phases of the application of electric power. For a copy of this book, B-5299, write Westinghouse Electric Corporation, Box 2099, Pittsburgh 30, Pennsylvania.

Electrical Equipment for Cotton and Rayon Mills—A new 35-pg booklet on electrical equipment for cotton and rayon mills is available from the Westinghouse Electric Corporation. Emphasizing that substantial savings can accrue from application of modern electrical apparatus, this booklet describes a complete line of electrical equipment for cotton and rayon mills—from switches to bleaching range drives. Lint-free motors, totally-enclosed Life-Line motors, and Life-Line gearmotors are among the individual products whose construction, operation, and application characteristics are discussed. Also among the equipment described are packaged-type AV adjustable speed drives, beamer and slasher drives. For a copy of this booklet, B-4799, write Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pennsylvania.

Filler Metal—The latest specifications for filler metal, issued jointly by the American Welding Society and American Society for Testing Materials (AWS Designation A5.7; ASTM Designation B 259) covers copper and copper-alloy welding rods for use with oxy-acetylene, carbon arc and inert-gas metal-arc (nonconsumable electrode) welding. The twelve classifications established by these specifications include copper, silicon bronze, phosphor bronze, copper-nickel, naval brass, manganese bronze, low-fuming bronze, nickel bronze and aluminum bronze welding rods. As with the other filler metal specifications for copper-alloy electrodes and for steel and aluminum filler metal, these new specifications specify the chemical composition mechanical properties and usability characteristics of each classification, with corresponding tests for verifying these properties. Copies of this may be obtained at 40 cents each from either American Welding Society, 33 West 39 St., New York 18, N. Y., or American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Bin Level Control—Fly ash, collected in a Cottrell precipitator in the power plant of a Midwestern public utility, is automatically measured and the bin level controlled by a single instrument, a Model 40 Rotax Controller, product of The Foxboro Co, Foxboro, Mass. Details of the low-cost system and its applications in chemical, power and processing plants are contained in the new Engineering Data Sheet, 823-12. The data sheet is available on request.

Radiotelephones and Direction Finders—Eight radiotelephone models, two radio direction finder models, and various accessory units are described in a new catalog identified as form 852. The Apelco brand radiotelephones listed include the model 18 for 30- to 150-mile communication; model 30 for 50- to 200-mile; model 51 for 75- to 300-mile; model 55 for 85- to 350-mile; model 76B for 100- to 400-mile; model 156B1 for 200- to 800-mile and model 190 for 250- to 1000-mile. In addition, the model 98—a separate transmitter—is indicated for 100- to 400-mile operation. Accessory units listed include a sectionalized spun glass whip antenna, plug-in crystals, a model 106 mobile public address system, indoor and outdoor extension speakers, microphones and press-to-talk hand sets. Write the Applied Electronics Co, Inc, 1240N Folsom St, San Francisco 3, California.

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Designed to fit every application better . . . standby, portable, mobile and stationary. *Whatever* your need for electric power, the new Onan CW-5 and 10 give you top performance and value!

Here for the first time are 5 and 10KW electric plants powered by revolutionary, new air-cooled gasoline engines, *designed and built by Onan exclusively for electric plant use!*

Both engines are 1800 R.P.M. The 13HP Onan engine which powers the CW-5 and the 20HP Onan engine used for the CW-10 weigh much less than general-purpose engines, and are amazingly compact. Built to deliver dependable, trouble-free service in heavy-duty use. Two-cylinder, alternate-firing design assures smooth, vibration-free power. New, quiet, highly-efficient vacuum air cooling drives out all heated air through *one* side duct. The same duct carries exhaust gases, simplifying installation.

Impulse-coupled, high-tension magneto ignition for quick starting under all conditions. Both models in all standard voltages 60-cycle A.C., single or three phase.

Far-Out-Front in design and engineering

- Twin-cylinder, horizontally-opposed, air-cooled, alternate-firing engines
- Aluminum-alloy cylinder heads
- Extra-large, replaceable bearings
- Full-pressure lubrication, 6-quart oil capacity, oil filter
- Impulse-coupled, high-tension magneto ignition, radio suppressed
- Quiet, vacuum air-cooling of generator and engine
- Excellent accessibility; snap-off air housings
- High-performance generators
- Completely equipped with controls and instruments.

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The Peterson Lineman's STAPLE PULLER

- Saves copper grounding wire!
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- Eliminates face and eye injuries!
- Works easily—just SET-PUSH-PULL!
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Public utility companies are invited to try this revolutionary lineman's tool at the special introductory factory price of $5.75 each, net; F.O.B. Wausau. Write to Dept. EW

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STEEL & WIRE COMPANY
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CATALOGS • BULLETINS

● **ALLOY STEEL BARS**—The Guide to Steel Selection is a new 4 pg booklet which covers in condensed form the characteristics, mechanical properties and uses of a comprehensive list of hot rolled and cold finished carbon and alloy steel bars. A copy of this brochure may be secured on request to Joseph T. Ryerson & Son Inc, Box 8000-A, Chicago 80, Ill.

● **WELDED PLATE RESISTORS:** A new bulletin 942-B describes the complete line of welded plate resistors for ratings up to 150-amperes continuous without internal paralleling of the grids in the section. The TAB-WELD-X Sections are also described. Write the Electric Controller Mfg Co, 2700 East 79 Street, Cleveland 4, Ohio, for information.

● **FLUORESCENT AND INCANDESCENT LIGHTING FIXTURES:** Over thirty different types of fluorescent and incandescent lighting fixtures are illustrated and described in a new 4 pg reprint from Sweet's Architectural File, units include: fluorescent troffers, surface mounting fixtures and cornice units, with interchangeable shielding media of lenses, louvers and diffusing glass; recessed incandescent boxes and special units. Copies of Sweet's Reprint are available from Gruber Lighting, 125 South First Street, Brooklyn 11, N. Y.

● **MOTOR SHOP EQUIPMENT:** A new catalog is available which will afford a buyer comprehensive coverage of the field of electrical materials and motor shop equipment and tools and may now be obtained. Copies free upon request by writing Brownell Distributors, Inc, 308 Canal Street, New York 13, N. Y.

● **PLASTICS:** A 4 pg illustrated bulletin (No CDP 654) describing GE custom molded nylon plastics parts has been issued by the General Electric Co, Chemical Division, Pittsfield, Mass. It suggests many mechanical applications and design possibilities and pictures more than 20 of the many nylon parts currently being molded.

● **LUMINOUS TUBE TRANSFORMERS:** A new 8 pg, two color bulletin on luminous tube transformers for indoor and outdoor application has been announced as available from the General Electric Company, Schenectady 5, N. Y. The booklet (GEA-5859) contains photographs and diagrams of the equipment, descriptive information and specification tables on standard design outdoor transformers, indoor hangar transformers, display sign transformers, and capacitor transformers.

● **BEAMA CATALOG:** The 1952-53 catalog compiled under the supervision of the BEAMA Publicity Committee has been released by the British Electrical and Allied Manufacturers Association, 36 and 38 Kingsway, London, W.C. 2. It contains illustrations, photos power plant operation information, fine language glossary and a classified buyers guide. For further information contact BEAMA at the above address.

● **LUBRICANT:** Bulletin 96, a two-color brochure describing the use of Molykote-Type A as an effective lubricant for helping to overcome the energy waste in internal combustion engines, is now being offered by The Alpha Corporation, 179 Hamilton Avenue, Greenwich, Conn. It describes the principle upon which the tenacity and lubricity of Molykote depends, the utilization of the peculiar characteristics of the unique molecular structure of molybdenum and sulfur which makes the compound a natural lubricant.

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• ARE YOUR BEST BUY!

You can protect your linesmen from arm and shoulder contacts (in a recent year 30% of all fatalities came from these contacts, according to a leading research organization) with Charco's Flex-Fit rubber sleeves, because they are

- Form fitting . . . flexible and comfortable to wear so linesmen will never ignore the safety necessity of wearing sleeves; wide shoulder design for full protection.
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Write for catalog of complete Charco line of linesmen's and industrial gloves, sleeves, aprons, clamps, safety devices. Full stock of styles, or special designs to your specifications.

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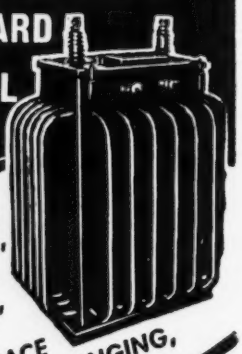
AIR • OIL • WATER-COOLED



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EISLER ENGINEERING CO., Inc.
769 SOUTH 13th ST NEWARK 3 N J. U.S.A.

● **CENTRIFUGAL PUMPS:** A new bulletin has just been released covering general purpose centrifugal pumps of the cradle-mounted type. The bulletin covers 5 basic cradle groups and 17 corresponding pump types, their capacities, horsepower ratings and uses. There are also two pages covering pump dimensions and a table of performance under 60 cycle use. In addition, two pages describing special purpose units and design modifications are included. For your copy of this bulletin contact your nearest Ingersoll-Rand branch office or write Ingersoll-Rand Company, Department C. P., 11 Broadway, New York 4, New York, requesting Form 7223.

● **ELECTRIC POWER DISTRIBUTION:** A new bulletin, a guide for plant engineers on electric power distribution practices in large and small plants, has been announced by the General Electric Company, Schenectady 5, N. Y. The 28-pg, illustrated, two-color bulletin, designated as GEA-5900, is entitled "Industrial Power Distribution Idea Book." The new publication covers utility distribution practices, methods of buying electric power, what to do when a choice or primary voltages is available, application of primary switches and circuit breakers, types and arrangements of primary cables, and types of load-center distribution systems.

● **AIRTUBES:** Lamson Corporation, Syracuse, N. Y., has issued a new colorful 30 pg booklet titled, "On Target." This booklet pictures and describes many uses for Lamson Airtube systems in modern industry and commercial enterprise. It shows how the handling of paper work is greatly speeded and simplified by the installation of an Airtube system. Copies of "On Target" are available from Lamson Corporation, Syracuse 1, N. Y.

● **PICKLING:** The 1952 edition of the standard reference work on pickling has now been issued by the American Chemical Paint Co, Ambler, Pa. Many sections have been revised and much new information and photographs have been included. This 80 pg brochure may be obtained by writing to the company at the above address.

● **CENTRIFUGAL BLOWERS:** Catalog B-10 is a new publication recently released by the Hartzell Propeller Fan Co. This 24 pg bulletin contains complete information in the form of photographs and charts of the centrifugal blower. Further information may be obtained from the company whose offices are in principal cities of the U. S.

● **HEATERS:** Application of heaters by machinery manufacturers is described in fourteen case histories in a new bulletin announced as available from the General Electric Co, Schenectady 5, N. Y. Designated GEA-5866 this 16 pg, two color bulletin employs 50 photos covering heating surfaces, melting soft metals, radiant heat, heating liquids and heating process air.

● **ELECTRIC MOTORS:** The cleaning of electric motors is described in the highly informative 4-pg bulletin on how to clean motors and generators with emphasis on the use of safer solvents, both from the standpoints of fire and health hazards. This is a reprint of a Safety Maintenance & Production article and contains many safety suggestions as well as detailed information on several types of blended solvents suitable for electrical maintenance. Write Fine Organics, Inc, Dept IM, 211 East 19th St, New York 3, N. Y.

● **HYDRAULIC CYLINDERS:** A new 28 pg two color Bulletin, No 701 on hydraulic cylinders has just been released. This bulletin describes the complete line manufactured by the Air and Hydraulic Division of Lindberg Engineering Company of Chicago, Illinois, 2443 Hubbard St, Chicago, Ill. Diagrams, photos and charts explain the different mounting types and capacities up to 1500 P.S.I. and 3000 P.S.I. working pressure. Booklet available on request.

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Digs holes 9" to 20" in diameter, 7' to 10' deep.

Sets poles 40' to 45' in length 2000 to 2500 pounds in weight

IN ANY SOIL . . .

The famous Highway Model HD Earth Boring Machine digs holes quickly and easily in any soil. Light enough for mounting on one and one-half ton truck. Or, can also be mounted on a tractor. Requires only six feet of platform space. Operates from truck platform where operator has clear vision. Quickly adjusted to dig at any angle. Single drive from engine furnishes all power.

A 2500-pound capacity winch and a pole derrick to handle 40-foot to 45-foot poles can be furnished with the Model HD as optional equipment. No separate drive from engine is needed for operation of their accessories.

Also available are the Model HC Earth Boring Machine for extra-heavy duty work and the Model P. E. Digger, an economical, completely portable machine for the occasional user.

Send today for your complete Highway Public Utility Equipment catalog. Or, for quick, first-hand information, call or visit the friendly Highway Distributor or Factory Branch nearest you.

Illustration shows Highway HD Boring Machine in operation. From position on truck platform operator is assured complete visibility Simple dual-levers give complete control at all times.

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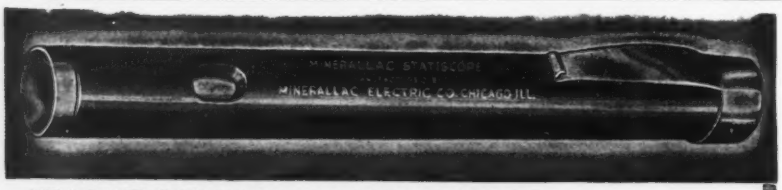

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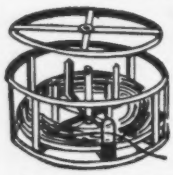

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KEEP
all the U. S. Saving Bonds you buy

Long Term plans

(*Continued from page* 87)

The benefication of iron ore may be of tremendous benefit to those of us along the Great Lakes, or the bringing in of the high quality ore from Labrador-Quebec may be quite helpful to power companies on the East Coast. Considerable research has already been done on the smelting directly of pig iron from high grade ore, and I look for further development of small steel mills because of the electric furnace, the Steckel Mill for hot rolling and cold rolling, and the development also of continuous casting.

Chemical Industries . . . We believe that there is almost no limit to the possible growth of chemical process industries. Many years ago I went to my sales manager with an idea as to where we could sell kilowatthours in large blocks. He told me to work on some particular jobs because if I closed one of them in five years, it would be worth it.

We were able to do that with considerable help from the growth in industrial production after Pearl Harbor. However, in chemical growth synthetic production rather than the old so-called "heavy chemicals" will be the ones to grow, and these new products can conceivably replace metals and other natural materials.

We know that the chemical industry as a whole spends from 1.5% to 3% of its gross revenues each year for research. That percentage is higher than many of us spend to operate our entire sales organization in the electric utility industry. I predict that out of these research labs will come a continuous flow of new materials and new products that will make living easier, more comfortable, and we hope, at somewhat lower cost.

Research . . . I sincerely believe that research as an industry has been neglected by many electric power companies because we, as managers of the electric industry, don't spend enough on research to really know that "research" is "big business." My point is that in looking ahead for business for the next year, for the next three years, for the next ten years really take the time to appraise your area as a location for fundamental and for pilot plant research.

I've noticed the ads of Public Service Electric and Gas Co (N. J.) on this subject. I think they are outstanding because they reflect one of the basic changes in doing business.

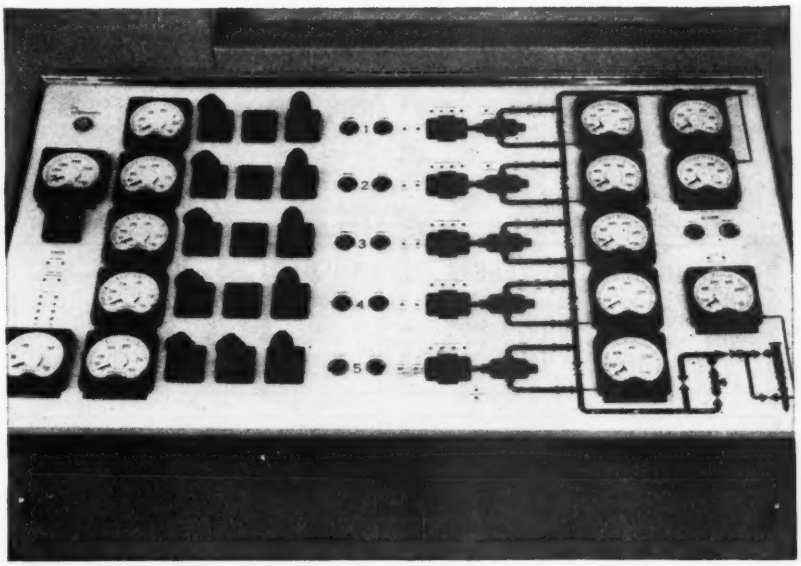
Business Changes . . . We have one large laboratory at Cleveland, the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics. As an example of the change in thinking on power loads, even in research laboratories. Lewis Lab originally wanted 5,000-kw firm and 40,000-kw off-peak for research on piston type engines. The load today is 30,000-kw firm with 110,000-kw off-peak, going up to 250,000-kw off-peak by 1955.

We have recently published a brochure entitled "Growth Industries Need Northeast Ohio." Listed in this brochure are the industries that we expect to grow faster than others. Both General Electric and Westinghouse expect to increase their appliance sales 130% by 1962—more than 2¼ times as much as in 1952. This tremendous growth in use of electricity in the home will be reflected in developments everywhere in the industry. As you probably know, Bendix recently announced its new combined washer and dryer. We think that this one appliance alone can result in an average residential business gain of 50%.

Plans for Growth . . . We do not feel that all these industries are going to grow automatically and that your business will automatically grow with them. The failure to plan successfully on a short range basis can keep a company from qualifying for long range potential of growth. I believe the same thing is true in our own particular job whether we are salesman, supervisor, or manager. We should make detailed plans for the next year—partial plans for the next two years—and just dream a little bit for the next five or ten years.

Growth brings problems to an organization, to a community, or to an individual. However, I'm certain that if we analyze our day-to-day job, plan ahead for tomorrow and for day after tomorrow, carry out the plans, then we will help our communities grow. We will help our companies grow. And most important to all of us, we will grow as well in the eyes of our bosses, our families, our fellow employees, and our fellow citizens.

Easy-reading K-24 Instruments



Help you design revolutionary control systems

Alert engineers often bring us new problems in instrumentation. They've hit on a new way to use electrical instruments to improve their operations. We've helped work out many problems like these, and we would like to do this kind of thinking with you.

The photograph above shows what can be done. This desk controls a pipeline booster station. These Westinghouse K-24 instruments are connected to special strain gauges and are calibrated in psi to show *pressures* in the strategic parts of the pipeline system. This revolutionary arrangement eliminated the usual pressure tubing and permitted safer, centralized control of this station.

Notice how much more *readable* these Westinghouse K-24 instruments are than the usual types—from sharp angles and from distances. This is a big factor in modern control board design. And the smaller size and longer scales permit the designer to save space. A single operator can control more processes because he can read the instruments from one place.

Call in Westinghouse when you need instrumentation. And write now for booklet B-4695, "Getting A Full Measure". Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pennsylvania.

J-40429

This is the super-readable Westinghouse Full-View K-24 instrument, a triumph of optical engineering. You can read it at sharp angles, and from far away. Glare, shadows and parallax are almost non-existent.

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1—	300	G.E	Non-Cond 150/175 lbs., 5/10 lbs. B.P., 480-3-60

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KVA	Make	RPM	Voltages	Frequency
1—3750	G.E.	300	2400/4150— 2400/4150	25/60/25
1—3125	G.E.	300	2400/4150— 2400/4150	25/60/25
2—2500	G.E.	750	2400/4150— 2400/4150	25/62½/60/24

MOTOR GENERATOR SETS

3 ph. 60 cy.

Qu	KW	Make	Speed	DC Volts	?	AC Volts
1—	2000	G.E.	514	600	?	6600/13200
2—	2000	G.E.	500	666	25 cy.	11000
1—	1500	G.E.	720	600		13200
1—	1500	G.E.	360	275		2200/4400
3—	1500	G.E.	514	250		6600/13200
3—	150(	G.E.	600	600		2300/4150
1—	1000	G.E.	900	260		4100/6900
2—	1000	Whse.	900	600		2300/4158
1—	500	Whse.	900	250		6609/13200
1—	500	Whse.	1200	125/250		2300
1—	500	Whse.	900	250		440
1—	500	G.E.	720	125		2300
1—	400	G.E.	720	250		440/2300
1—	350	G.E.	900	125		4150
1—	150	G.E.	1200	275		2300
1—	150	Whse.	1200	275		2300

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KVA	Make	Type	Ph	Voltages
3—1250	G.E.	HVDDJ		6600x550
1—1150	A.C.	OISC		13200x480/2400
3—1000	G.E.	HVDDJ	1	2200x480
5— 300	G.E.	HT	3	2400x240/480

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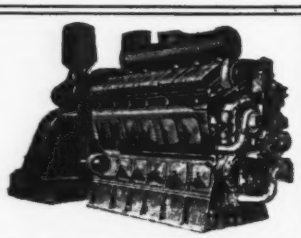

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1136	Fairbanks Morse	38D	1600	720	250	Fairbanks Morse	37-E	375	360
1100	General Motors	16-278A	1600	720	200	General Motors	8-268A	350	900
750	General Motors	12-567	1080	720	150	Worthington	CC-4	225	450
500	Baldwin	VO-8	750	514	150	Buckeye	80	240	600
500	General Motors	8-278A	750	720	100	Worthington	BB-5	150	600
500	General Motors	8-567	720	720	100	General Motors	3-268A	150	1200
400	Ingersoll-Rand	8-8	600	720	60	General Motors	6-71	90	1200
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2— 400 KVA Pitts., 1 Ph., 2400/4800V. 240/480V.
3— 333 KVA Whse., 1 Ph., 2400V. 600 V. sec.
2— 200 KVA G.E., 3 Ph., 4150V. 120/240V. sec.
1— 200 KVA G.E., 3 Ph., 2400-220 sec.
3— 200 KVA Mol., 1 Ph., 2300 V. 220/440.

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2— 150 H.P., Al. Chal. 360 RPM, 440V. 3/60

MOTOR GENERATOR SETS

1—1000 KW Whse., 600 V. 720 RPM, 4000 Syn.
1—1000 KW G.E., 600 V. 514 RPM, 4000V Syn.
1—1000 KW Whse., 275 V. 720 RPM, 4000 Syn.
1— 176 KVA West., 1Ph., 220V. Motor 3Ph., 400V.
1— 150 KW G.E., 126/250V. 1200 RPM, 2300 Syn.
1— 100 KW G.E., 250V. 900 RPM. 2300V. Syn.

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1— 400 H.P., West. CW, 450 RPM 550V.
1— 250 H.P., West., CW, 600 RPM, 440V.
1— 200 H.P., West., CW, 600 RPM, 440V.
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1— 100 H.P., G.E., MT 600 RPM, 440V.

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TRANSFORMERS

Qu.	KVA	MFR.	VOLTAGE
6	2000	G. E.	66000/114000 Y—2400
4	500	Pitts.	66000/33000—13200/23000 Y
4	500	West.	69000—6900
3	200	Pitts.	66000—2300
3	200	A. C.	45000—2400/7200
4	150	West.	44000/33000—2300/6900
6	100	G. E.	44000—2300
3	75	West.	44000—7200/12470 Y
6	25	G. E.	44000/22000—2200/480
4	5000	G. E.	40935/70900 Y—14500
3	5000	G. E.	38100/66000—6600
1	18750	A.B.B.	34840—11000, 3 ph.
2	5000	West.	33000—26400, 3 ph.
4	500	G. E.	33000—7200/12470 Y
3	250	Mol.	33000—13800/23900 Y
3	200	A. C.	34500—2400/7200/12470 Y
3	100	West.	33000—240/480 NEW
3	100	A. C.	33000—7200/12470 Y
3	75	Wag.	33000—7200/12470 Y
6	2125	G. E.	26400/13200—2300
4	1500	A. C.	25400/44000 Y—6900/13800
4	450	A. C.	25410/44000—13280/23000
6	100	G. E.	22000—7200/12470 Y
9	50	G. E.	22000—2300
1	5000	Mol.	13800—460, 3 ph.
1	450	Penna.	13200—2400, 3 ph. ASKAREL
3	200	G. E.	13800—2300
3	150	Mol.	13200/22800 Y—2300/4000 Y
3	250	Pitts.	7200—220/440
3	100	G. E.	7200—240/480
3	150	Wag.	6900—2300
3	37½	G. E.	6900—230/460
2	100	G. E.	4800/2400—480/240
3	333	G. E.	2400/4160 Y—240/480
2	250	West.	2300—460
3	150	West.	2400—230/115
1	100	G. E.	2300—575, 3 ph.
6	50	West.	2400—114/228 DRY TYPE

INDUCT. REGULATORS—OUTDOOR

1—140 KVA G. E. 200 A 4000 V. 3 ph.
4— 60 KVA West 250/500 A. 2400 V. 1 ph.
6— 48 KVA G. E. 200 A. 2400 V. 1 ph.
8— 36 KVA West. 150/300 A. 2400 V. 1 ph.
2— 36 KVA G. E. 75/150 A. 4800 V. 1 ph.

CIRCUIT BREAKERS

1— 400 A. 37 KV G. E. FHKO-236-500 MVA
1—1200 A. 15 KV G. E. FKO-139-350 MVA
4— 600 A. 15 KV G. E. FHKO-139-750 MVA
1— 600 A. 15 KV G. E. FHKO-138-250 MVA

BREW, WOLTMAN & CO., INC.

52 Church St. New York 7, New York

TRANSFORMERS

FOR SALE

6—1000 KVA Mol. 11500—2400/4160Y
3— 500 KVA Pitts 22000—2300/4000Y
3— 500 KVA G-E 22000—2300/4000Y
3— 333 KVA W-H 6600—2300
3— 200 KVA G-E 22000—2300
3— 200 KVA Mol 3450—2300
3— 150 KVA G-E 44000—600/2400
3— 150 KVA G-E 19050/33000Y—2540/4000Y
3— 150 KVA A-Ch. 13800—2400/4160Y
2— 150 KVA G-E 6900—230/460
3— 100 KVA G-E 33000—6900/11950Y
3— 100 KVA G-E 13200—2300
3— 50 KVA A-Ch 33000—6900/11950Y
3— 50 KVA A-Ch 33000—2400/4160Y
3— 50 KVA A-Ch 13200—2300/4600

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- Special constructions. Odd lengths.
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- Cut to length. Reasonably priced.

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(Classified Advertising)
H. E. Hilty, Mgr.

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Twins?

No!

It would be easy to persuade almost anyone that these two pieces of strand are identical twins. If you go by their looks, you can't tell one from the other. Yet actually, they're as different as high noon and midnight.

One is conventional strand, and when you cut it, the wire ends are going to spring apart—yes, spring apart—because of internal tension. To beat this, you have to seize before cutting.

The other piece is Bethlehem Form-Set strand, the preformed kind. This you can cut, and absolutely nothing happens. All the wires lie calmly in place. No springing apart; no "bushing out." Hence, no seizing needed. After the cut, the ends are clean and smooth—ends that go into a fitting as easily as a rigid rod.

That's what preforming does for a strand. It gives the wires a permanent curl that largely nullifies internal tension. Thus the wires aren't all "keyed up"; they have no urge to fly apart when a cut is made.

This is a Form-Set advantage that appeals to every lineman. There isn't any handling problem—none at all—when the lineman slides those neat, trim ends into his fittings.

All five grades of Bethlehem strand (common, siemens-martin, high-strength, extra-high-strength, and utilities) can be obtained with the Form-Set feature. And all five grades are protected by the rust-resisting bethanized coating, which doesn't peel or crack, even under repeated bending.

Sound pretty good? Order a reel and check for yourself.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

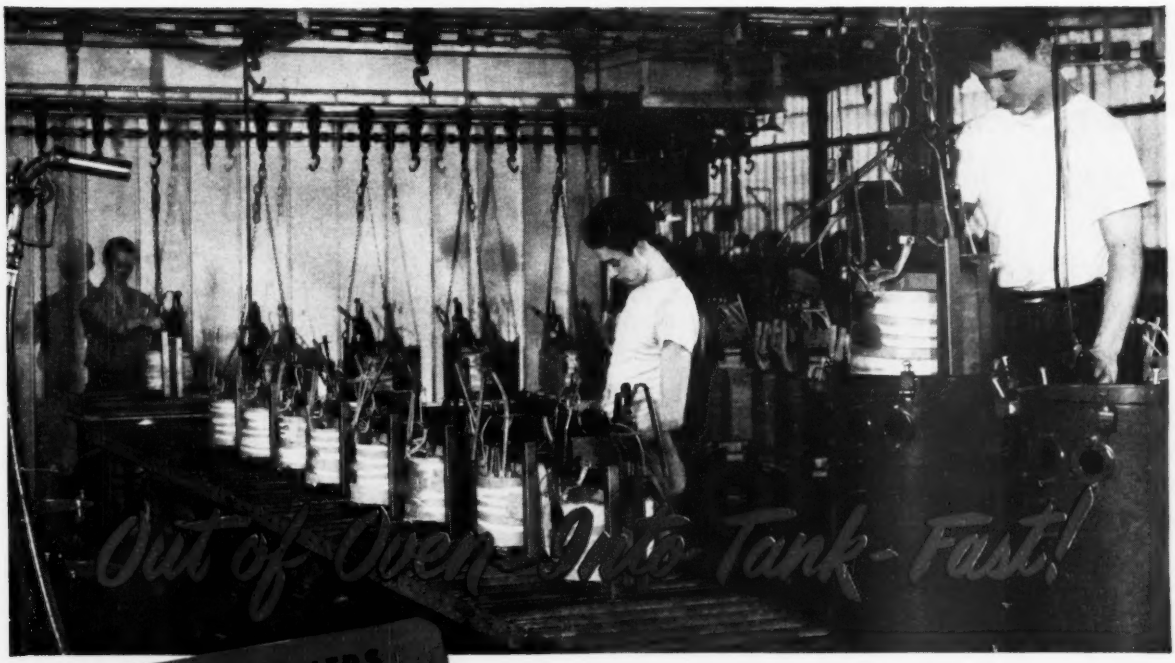
NOW do they look like twins?

The bushy specimen isn't a preformed strand. A tough customer, unless you seize it before cutting. But look at the Form-Set strand—the one with the clean-cut end. No seizing required at all!

Bethlehem *FORM-SET* Strand

BETHLEHEM STEEL

How Moisture is Kept Out of Transformer Coils



Fast sequence from drying oven into tank is one reason why you get consistently excellent insulation quality in Allis-Chalmers distribution transformers.

Here's How It's Done

Core and coil assemblies move continuously through the tunnel-type electrically heated oven partly shown in the background above. Then . . . immediately after the drying cycle is complete . . . they are immersed in dry oil in their own tanks. This prevents any absorption of moisture that might have occurred if the cooling had been done in air. Then a vacuum drawn on the transformer removes any air entrapped in the oil.

Finally, Production Line Impulse Testing

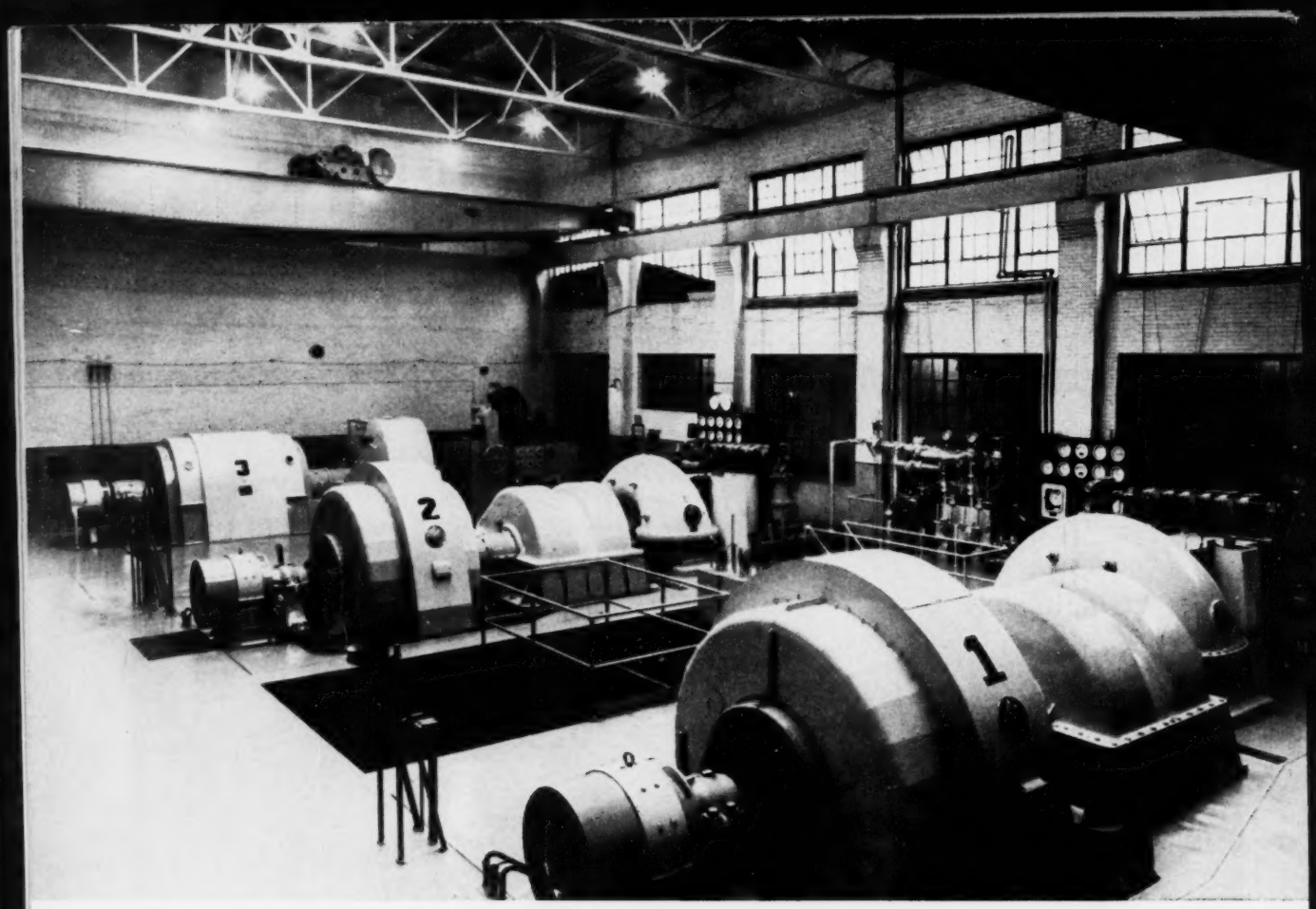
As a final step, production line impulse testing is used to assure uniform high insulation strength.

Get All Benefits

Careful attention to manufacturing detail is only one of the many reasons why you benefit when Allis-Chalmers distribution transformers are on your system. For complete information, call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wis.

A-3977

ALLIS-CHALMERS A-C ALLIS-CHALMERS



17-year record shows savings you can make with...

NONPAREIL
TRADE MARK
Turbine Oil

• Turbine oil changed every three years, oil systems cleaned every year, filters cleaned every four months . . . that was the oil system maintenance routine in the power plant of a mid-west paper mill before the switch was made to NONPAREIL Turbine Oil.

Recommended by a Standard Oil lubrication specialist, NONPAREIL has been used for 17 years in the plant's two 4,000-KW units and for 12 years in its 5,000-KW unit. The original fills of oil have never been removed from the turbines. Neutralization numbers have remained below 0.09 mg. KOH/gm. The oil systems have never needed cleaning.

While the lubricant and maintenance savings already realized by this power plant are impressive, they are just a beginning. Trouble-free lubrication and consequent savings are *assured for the life of these turbines.* This is based on the written guarantee, given with each fill of NONPAREIL, that this unique lubricant will last as long as the turbine, and that its neutralization number will stay below 0.15 mg. KOH/gm.

A Standard Oil lubrication specialist will be glad to show you record after record, each covering over 20 years' operation, where NONPAREIL has eliminated oil replacements, oil system cleaning, and troubles caused by excessive oil acidity. All you need do is phone your local Standard Oil (Indiana) office. Or, write Standard Oil Company, 910 South Michigan Ave., Chicago 80, Illinois.

STANDARD OIL COMPANY
(Indiana)

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